Pit and Quarry

With which is consolidated

CEMENT-MILL & QUARRY

May, 1935

NRA CODE GRAPHIC ARTS INDUSTRY 1934

NO SULPHUR TROUBLES *when you use*

TECHNICOAL

PROCITE TREATED

Procite conditioning not only oxidizes all sulphur from coal ash during actual combustion but also removes sulphur from other cement-making materials. This results in a clinker well under .001% in sulphur, producing better color, more complete flux of *all* materials and greater tensile strength.

1 Less coal per barrel.
2 Lower grinding costs.
✓3 Greater tensile strength.
✓4 Better cement color.
5 Uniform operating conditions.
6 Uniform cement clinkers.
7 Shortened burning zone.
✓8 Lowered sulphur content.
9 Reduced kiln ring formation.
10 Maximum kiln operation.

POWHATAN COAL also Procite Treated

This free booklet of full information sent upon request.

TECHNICOAL SALES CORPORATION

Exclusive Sales Agents

1010 EUCLID AVENUE • CLEVELAND, OHIO

THIS IS NUMBER SIX OF A SERIES OF TECHNICOAL ADVERTISEMENTS

★ Pages 19-21

Since 1929 the largest net paid A. B. C. producer circulation in the field

A lesson in STAMINA at Bonneville Dam

BONNEVILLE DAM is the latest huge Western PWA project to present motor trucks with the toughest jobs they've ever faced. And again, super-duty Macks have proved their worth—carrying 20-ton loads through quagmires of mud and over steep grades—helping to transport in all 9,285,000 cubic yards of rock, earth and other fill, and cement.

After a killing seven-month schedule of continuous three-shift operation, Macks have shown less than 1% time out for mechanical attention!

This record is not surprising to the contractors, who specified Macks exclusively for this work. They knew about Boulder Dam and San Gabriel—where Macks had established astonishing records in economy and reliability under the same adverse conditions. That is why, when trucking jobs seem impossible, contractors look to Mack—the truck designed and constructed for the utmost in dependability, load capacity, and *stamina.*

Macks are specifically built for super-duty service—nothing less could have rushed these vast jobs through on schedule. Rugged construction, reserve power, and extra long life are a part of every Mack Truck. That's why Macks do the toughest trucking jobs better and more economically than price-built vehicles.

MACK TRUCKS, Inc.
25 Broadway, New York, N.Y.

AN UNUSUAL PICTURE OF AN UNUSUAL PLANT

Designed and Equipped by LINK-BELT
for McGrath Sand & Gravel Co., Chillicothe, Ill.

A MODERN concrete and steel plant with the best of washing, screening and sizing equipment for gravel, as well as classifying equipment for sand, to meet the most rigid aggregate material specifications. Includes modern stock pile system with overhead distributing conveyor and tunnel with conveyor system for recovering and loading into cars.

Since 1912 Link-Belt has designed, built and equipped 10 complete plants for McGrath, of which this is the most recent.

LINK-BELT

EQUIPMENT FOR PREPARING SAND—GRAVEL—STONE

LINK-BELT COMPANY 5260

The Leading Manufacturer of Equipment for Handling Materials and Transmitting Power
PHILADELPHIA . CHICAGO . INDIANAPOLIS . ATLANTA . SAN FRANCISCO . TORONTO
Offices in Principal Cities

MAY 25 1935
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Pit and Quarry

With which is consolidated
CEMENT-MILL & QUARRY

Volume 27 May, 1935 Number 11

MEMBER AUDIT BUREAU OF CIRCULATIONS

Published on the first of each month for producers and manufacturers of Cement, Crushed Stone, Gypsum, Lime, Sand, Gravel and other non-metallic minerals. Entered as second-class matter November 28, 1932, at the Postoffice at Chicago, Ill., under the Act of March 3, 1897.
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H. W. BAUMGARTNER
President

S. A. PHILLIPS
Vice-President and Directing Editor

Field Editor:
W. E. TRAUFFER

News Editor:
CHARLES MARTIN

Production:
W. T. KLUSSMAN

Advertising Manager:
JAMES E. MONTGOMERY
Telephone *HARrison 9357*
Chicago, Ill.

Eastern Advertising Manager:
E. M. BUCK
4200 Chrysler Bldg.
Telephone *VANderbilt 3-0590*
New York, N. Y.

Central Advertising Manager:
W. E. COATES
604 Century Bldg.
Telephone *CHerry 8192*
Cleveland, Ohio

Western Advertising Manager:
W. A. BUSCHMAN
Telephone *HARrison 9357*
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Circulation Manager:
W. H. SANDERSON

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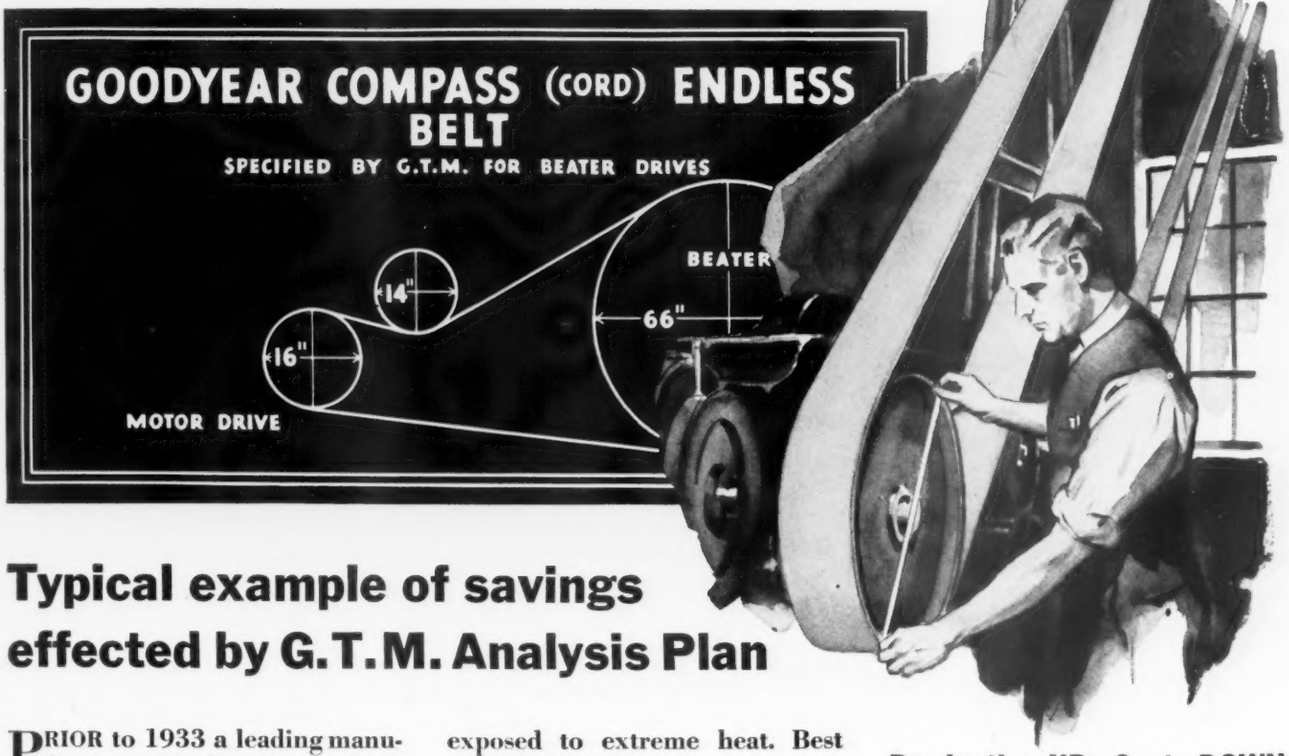
NRA U.S. CODE GRAPHIC ARTS INDUSTRY 1934

IN ONE YEAR HE CUT THEIR BELTING BILL IN HALF



Typical example of savings effected by G.T.M. Analysis Plan

PRIOR to 1933 a leading manufacturer of paper containers was plagued with belt trouble. On some drives belts were giving only a few weeks' service; six months was exceptional on others.

Then the G. T. M.—Goodyear Technical Man—entered the picture. This practical expert made a detailed study of operating conditions—analyzed every drive—and finally recommended a complete belting program.

Here are the records of some of the severest drives in the plant since the adoption of the G. T. M. plan.

Not one service failure

Hot Air Fan on paper machine. A difficult high speed drive, exposed to extreme heat. Best previous belt gave six weeks' service. G. T. M.-specified Goodyear COMPASS Belt has given 2 years' continuous service—and the motor has never been taken up!

Helper Drive on paper machine. Adverse heat and water conditions. Previous belts lasted 5 to 6 months. Goodyear COMPASS Belt still going strong after full year's service.

Agitator Drive. Previous belts broke down every three weeks. Goodyear COMPASS has given 18 months' trouble-free service.

Whipper Drive—runs in water continuously. Former belts lasted 3 days to a week. Goodyear COMPASS in service 18 months.

Production UP—Costs DOWN

As a result of this exceptional service, the company reports that although their production was greater, their belting costs were reduced 50% the first year under the G. T. M. plan.

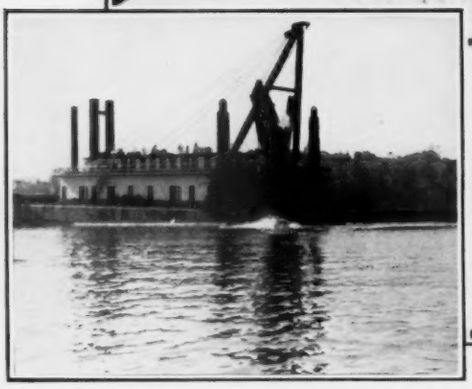
The G. T. M. is ready to make a similar money-saving analysis for you—to specify *service-proved* Goodyear products to your individual operating requirements. To consult him, write Goodyear, Akron, O., or Los Angeles, Calif.—or the nearest Goodyear Mechanical Rubber Goods Distributor.

BELTS · MOLDED GOODS
HOSE · PACKING
MADE BY THE MAKERS OF GOODYEAR TIRES

THE GREATEST NAME IN RUBBER

GOODYEAR

BEHEMOTH, TAKE A BOW!



TOLEDO III

Owned by M. A. Breymann. Operates a 17-yard bucket for hard digging—a 28-yard bucket for soft digging. 150 feet in length—55-foot beam—12 feet from deck to bottom. Boom 85 feet long—10-foot boom sheave. Has largest main hoist rope ever built for this type of equipment!

BEHOLD the "Big Bertha" of dipper dredges—the mightiest dredge ever to dip below the waters of the earth. Operating under 50 feet of water through the steel muscles of **American Steel & Wire Company Tiger Brand Wire Rope**—it loads a 1500 yard scow in practically two hours—and doesn't even work a "sweat" up about it. When it came to selecting the right wire rope to engineer this giant—naturally the owners of this largest Dipper Dredge in the world turned to the builders of the largest selling wire rope in the world—**Tiger Brand Wire Rope.** Wherever dredges dip, derricks swing and weights suspend, you'll find this safer—more dependable—more economical wire rope operating in the thick of things. Facts—and full cooperation—await your inquiry.

LARGEST DIPPER DREDGE IN THE WORLD CHOOSES

TIGER BRAND
REG. U. S. PAT. OFF.
WIRE ROPE

AMERICAN STEEL & WIRE COMPANY

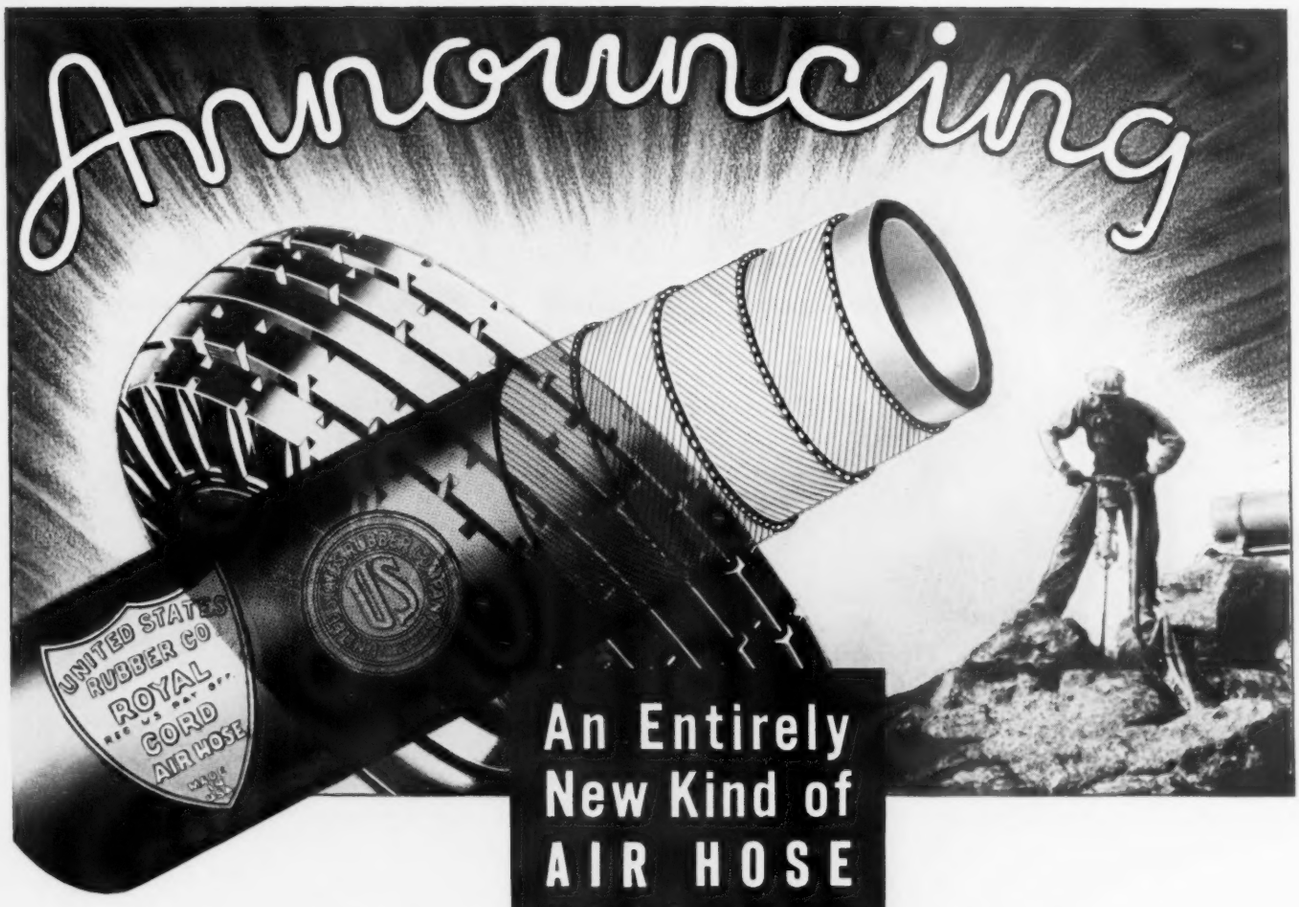
208 S. LA SALLE STREET, CHICAGO • • EMPIRE STATE BUILDING, NEW YORK

Offices in All Principal Cities

Pacific Coast Distributors: Columbia Steel Company, Russ Building, San Francisco

Export Distributors: United States Steel Products Company, New York

United States Steel Corporation Subsidiary



An Entirely New Kind of AIR HOSE

U. S. SUPER ROYAL CORD

Built like a Tire

● "U.S." introduces a brand new *type* of hose for pneumatic tool and air drill service—U. S. Super Royal Cord, the *only* air hose built *like a tire.*

The body of the hose is made with each layer of "tire-like" cords laid in tough rubber cushions, isolated from adjacent layers to prevent rubbing or shearing. Consequently, the hose can withstand any amount of pulsation, sudden expansion under pressure, or constant flexing in use.

This new kind of hose carcass makes "U.S." Super Royal Cord so tough and resilient that it shows a *remarkable* resistance to external blows, bruises and abrasion. This durability is due both to the internal structure and the specially compounded brown rubber cover, which will stand unusual abuse and will not peel off, when cut or gouged.

Furthermore, the tube of the "U.S." Super Royal Cord is the finest quality oil-resistant rubber it is possible to make—your assurance of protection against the destructive action of hot oil in the air line.

This is the hose with *all* the good qualities you have always wanted. There's nothing else like it on the market. Let "U.S." give you complete data and description, without obligation of course. Write the "U.S." Rubber Products, Inc. branch.

United States Rubber Company

1790 Broadway • • New York City

U.S. SUPER ROYAL CORD HOSE

An Outstanding Value of the United States Rubber Company

NOW TRY THESE BETTER ROPES

We have developed new and better wire rope for construction work and heavy duty that has heretofore been considered an engineering impossibility. Better ropes than we have ever thought could be made. Let us discuss with you your needs at once for the big contracts let for 1935.

We are in position to furnish quickly every type of conveyor equipment for economical transportation, regardless of the technical problems they must encounter.

Aerial transportation is Real Economy on large undertakings.

Williamsport

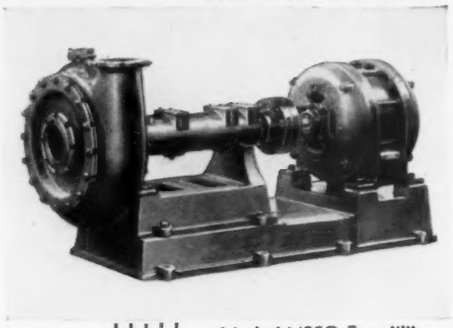
WIRE ROPE COMPANY

Main Office and Works: Williamsport, Penna.

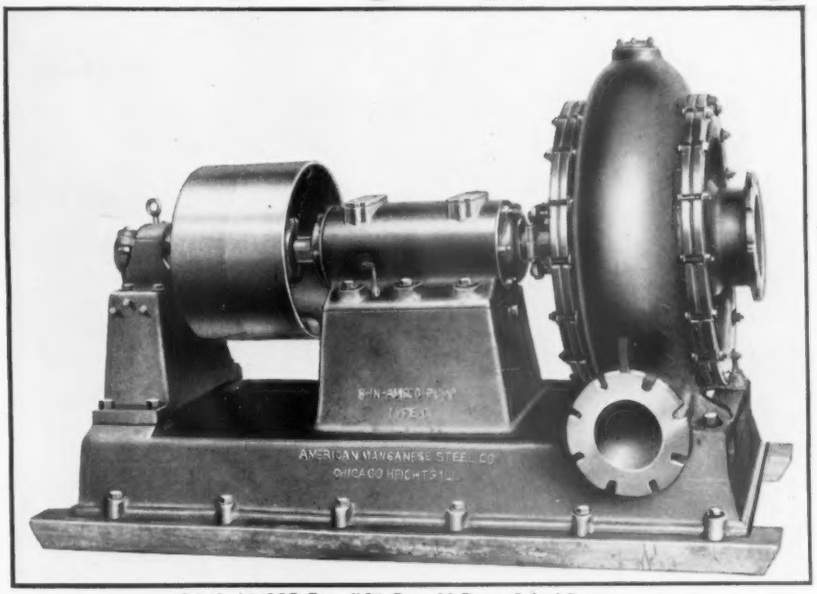
Branch Sales Office: 122 S. Michigan Ave., Chicago

AMSCO DREDGE PUMPS

TRADE MARK REGISTERED



6-inch AMSCO Type "I", Form 20 Pump, Directly Connected Design with Electric Motor, Right Hand, Top Discharge.



8-inch AMSCO Type "C", Form 30 Pump, Belted Design, Left Hand, Bottom Discharge.

Embody—

DURABLE CONSTRUCTION AND LASTING EFFICIENCY

AMSCO Dredge Pumps reflect their ability to stand up when being pressed the hardest for production. They afford maximum protection against operation shutdowns.

AMSCO Dredge Pumps have been carefully designed to meet all the requirements of sand and gravel pumps. All wearing parts are made of manganese steel. They stand up under the severest tests. Their use will save delays and reduce operating costs.

AMSCO Pumps embody: sturdiness with rigidity of construction; simplicity; unusually heavily proportioned shafts and bearings with maintained accuracy of shaft alignment; ample lubrication for bearings with free-flowing oiling facilities, together with large oil reservoirs; accessibility and quick, positive impeller adjustment; ease of replacement of wearing parts; and remarkably high capacity under severe head conditions.

The continued success of AMSCO Pumps is due to a policy of building with quality, assuring Durable Construction and Lasting Efficiency, and their correct installation by experienced engineers familiar with the problems involved in pumping abrasive materials.

AMSCO Pumps are built in standard 3-inch, 4-inch, 5-inch, 6-inch, 8-inch, 10-inch, 12-inch, 16-inch, and 18-inch sizes for all types of drives.

Pumps built to meet individual user's requirements.

Flap Valves, Elbows, Pipe, Pipe Flanges, Ladders, Drive Gears, Cutter Heads, Teeth.

We invite your inquiry for performance data and details on the type of AMSCO pump best suited to your operations.

AMERICAN MANGANESE STEEL COMPANY

Owned by American Brake Shoe & Foundry Company

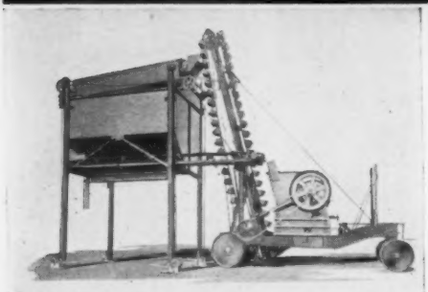
396 East 14th Street, Chicago Heights, Ill.

Foundries at Chicago Heights, Ill.; New Castle, Del.; Denver, Colo.; Oakland, Calif.; Los Angeles, Calif. • Offices in Principal Cities.

In sand and gravel plant equipment you can best combat rapid wear due to abrasion and breakage due to shock by using cast parts of AMSCO manganese steel. We will be glad to furnish detailed information on request. Send complete details of your requirements with inquiry.

More CAPACITY Greater PORTABILITY

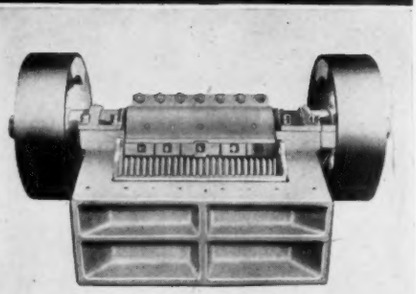
AND LOWER MAINTENANCE COSTS ARE YOURS IN ANY **CEDAR RAPIDS PLANT** YOU BUY



CEDAR RAPIDS STONE SIZING PLANT

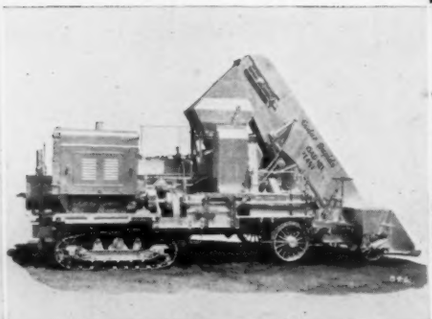
WHATEVER YOUR REQUIREMENTS MAY BE IN THE MATERIAL PRODUCING OR HANDLING FIELD, YOU WILL ALWAYS FIND A CEDAR RAPIDS PLANT THAT WILL DO A BETTER JOB.

ASK FOR OUR CATALOGS AND BULLETINS BEFORE BUYING.

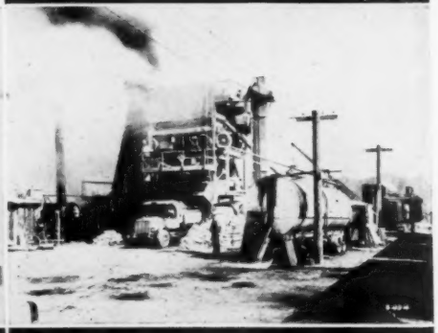


CEDAR RAPIDS JAW CRUSHER

TANDEM STRAIGHT LINE PLANT WITH DIESEL POWER

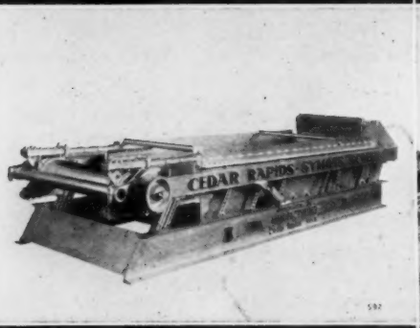


TRAVELING ROAD MIX PLANT

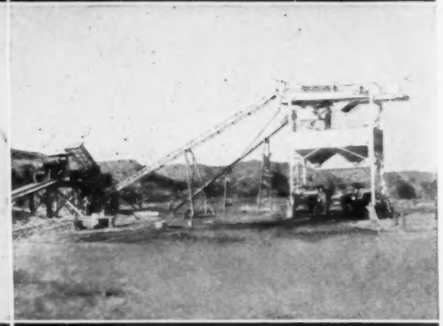


STANDARD CEDAR RAPIDS ASPHALT PAVING PLANTS

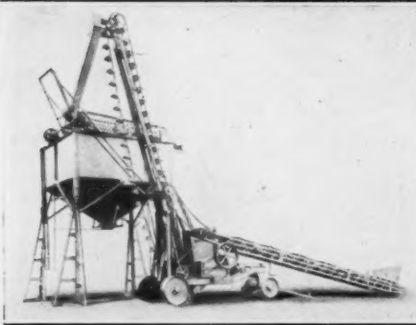
SCREENING AND LOADING PLANT



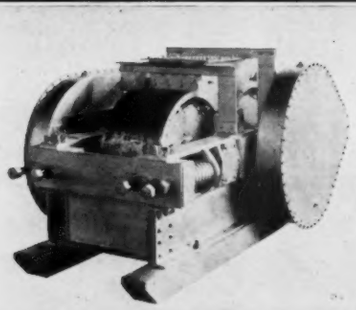
CEDAR RAPIDS SYMONS VIBRATOR SCREEN



PORTABLE WASHING PLANTS



PORTABLE QUARRY OR GRAVEL PLANT

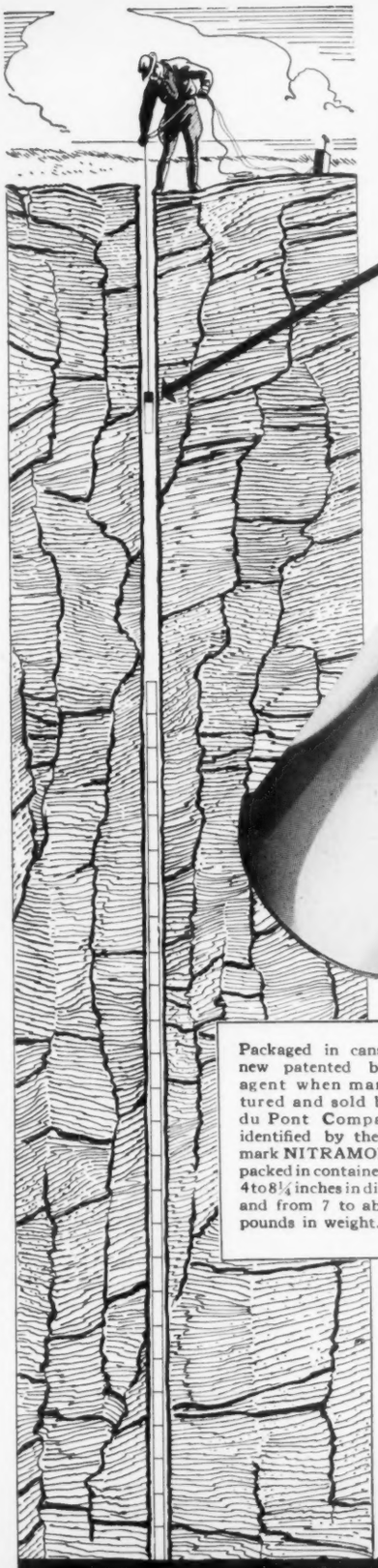


CEDAR RAPIDS ROLL CRUSHERS

PORTABLE PRIMARY CRUSHER

IOWA MANUFACTURING COMPANY

CEDAR RAPIDS, IOWA



NITRAMON

TRADE MARK

NITRAMON can only be detonated when dynamite or T. N. T. cartridge is used.

is safer!

WHEN subjected to the usual tests applied to explosives, NITRAMON cannot be detonated *by the strongest commercial blasting cap—by Cordeau—by flame—by friction—or by impact.* NITRAMON develops exceptional blasting strength when detonated by a cartridge of either dynamite or T.N.T. This cartridge is placed on the top of a column load of Nitramon in a well drill hole.

Until the priming cartridge is in place, there is no danger while loading NITRAMON. In case of a misfire due to any outside causes, the primer can be removed and the NITRAMON becomes safe to be unloaded by any of several methods.

In addition to its *safe* features, NITRAMON has other important advantages:

1. SAVES MONEY—Its design is so efficient that satisfactory results are obtained at substantial savings.

2. SEALED AGAINST WATER—Packed in water-tight metallic containers.

3. WILL NOT FREEZE.

4. PRODUCES NO HEADACHES—Contains no nitroglycerin.

5. LOADS QUICKER—Because of its convenient package.

A bulletin containing complete information on grades available and methods of use will be sent on request.

Packaged in cans, this new patented blasting agent when manufactured and sold by the du Pont Company is identified by the trade mark NITRAMON. It is packed in containers from 4 to 8¼ inches in diameter and from 7 to about 65 pounds in weight.

E. I. DU PONT DE NEMOURS & CO., INC.
Explosives Department, Wilmington, Delaware

BRANCH OFFICES—Birmingham, Ala.; Boston, Mass.; Chicago, Ill.; Denver, Colo.; Duluth, Minn.; Huntington, W. Va.; Joplin, Mo.; Juneau, Alaska; Kansas City, Mo.; New York, N.Y.; Pittsburgh, Pa.; Portland, Ore.; Pottsville, Pa.; St. Louis, Mo.; San Francisco, Calif.; Scranton, Pa.; Seattle, Wash.; Spokane, Wash.; Springfield, Ill.; Wilkes-Barre, Pa.

DU PONT

REG. U. S. PAT. OFF.

NITRAMON

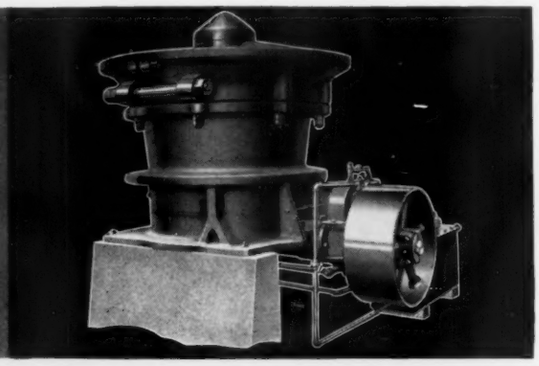
TRADE MARK

THE IMPROVED BLASTING MATERIAL

DESIGNED TO MEET TODAY'S CONDITIONS—*profitably*

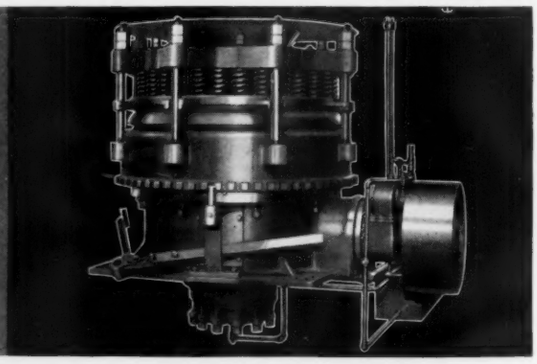
Modern in every sense of the word .... designed to enable you to meet today's conditions and operate at a profit .... this 3-piece combination of Telsmith equipment is a striking example of group efficiency.

PRIMARY BREAKER
•
FOR COARSE CRUSHING



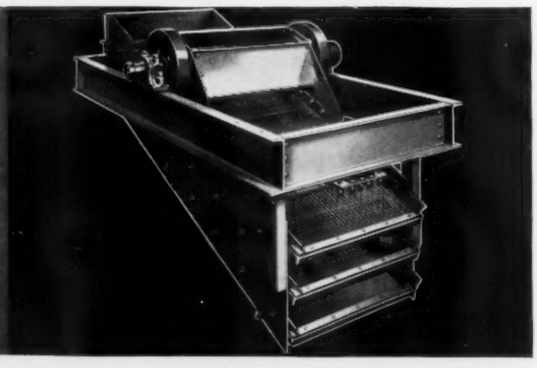
Has a fixed shaft and sleeve eccentric. Short, compact, with steel frame and steel crown, it is the outstanding performer on hard rock. Cut steel drive gears and force feed oiling permit higher eccentric speeds and faster gyration. Larger head and concave diameters, with greater receiving and crushing area, allow faster feeding. Parallel pinch starts immediately, crushes full tilt all way down; guarantees bigger capacity. Write for Bulletin B-15.

GYRASPHERE CRUSHER
•
FOR FINER CRUSHING



The Telsmith Gyrasphere takes the trouble out of secondary crushing. Working at choke feed, it turns out a bigger tonnage and more cubical product—crushes finer, with low power consumption and up-keep. The reasons—spring relief, rotary head support, spherical head, unit spring design, anti-friction thrust bearings, pressure lubrication, different distribution of crusher pressures. Write for Bulletin Y-15.

PULSATOR
•
FOR EFFICIENT SCREENING

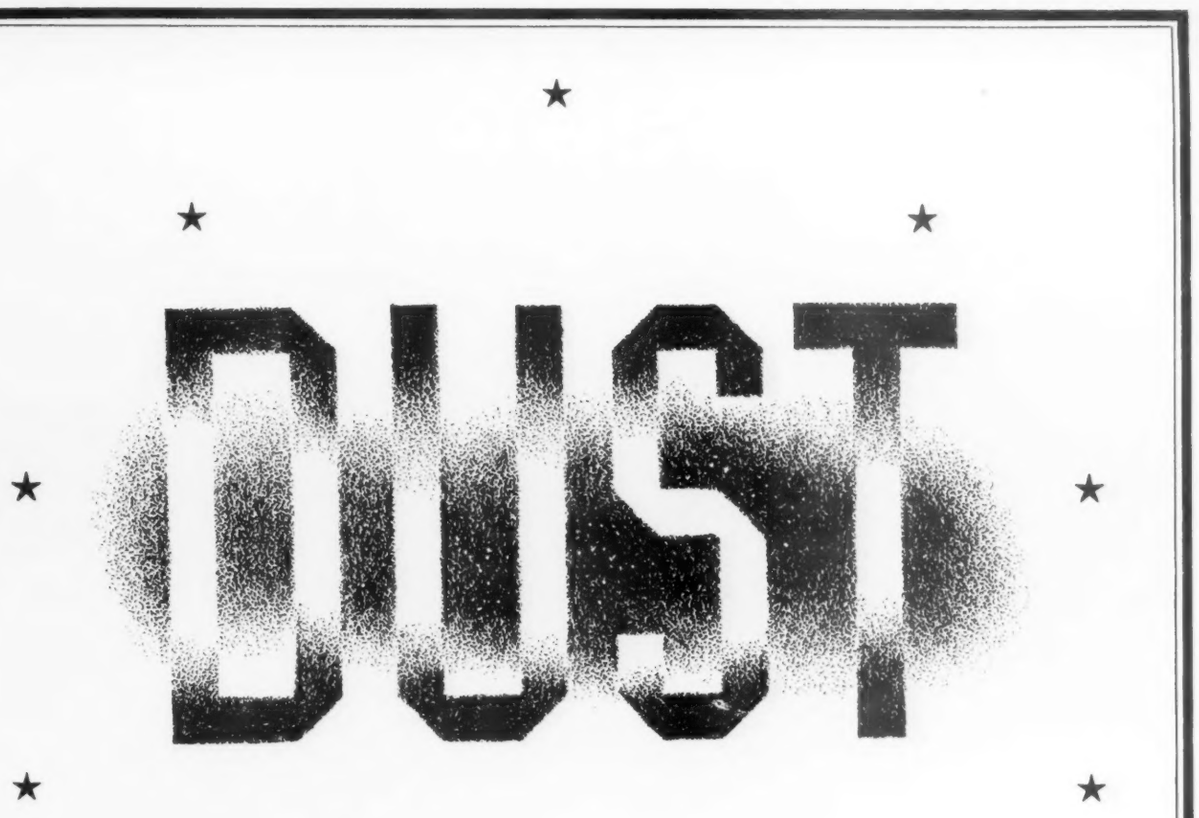


The Telsmith Pulsator screens crushed rock, sand, gravel, ore or coal...wet or dry. Its circular movement produces a maximum screening action, uniform on every inch of the wire, on every deck, under any load. The toughest alloy steels, the finest anti-friction bearings and special labyrinth and piston ring steels (to protect working parts) give longer life and lower up-keep. Write for Bulletin V-15. M-2

SMITH ENGINEERING WORKS
504 EAST CAPITOL DRIVE, MILWAUKEE, WIS.

TELSMITH

50 Church St. . . . . New York City
211 W. Wacker Drive . . . . . Chicago, Ill.
130 So. 15th St. . . . . Philadelphia, Pa.
605 Statler Bldg. . . . . Boston, Mass.
412 Westinghouse Bldg. . . . . Pittsburgh, Pa.
Choctaw C & M Co. . . . . Memphis, Tenn.



GET OUT OF THE DUST CLOUD!

Over a million acres of the richest wheat fields in the United States have been totally destroyed by DUST storms in the mid-west. Scores of persons have been killed, hundreds injured, by the uncontrollable destructiveness of DUST.

●

DUST IS A MENACE TO INDUSTRY, TOO. For untold years it has exacted staggering wealth from the workers of the world. It has levied a toll on health and a tax on profit greater than any other natural or mechanical cause. DUST is Man's common enemy!

●

Unlike the dust storms in the mid-west DUST IN INDUSTRY CAN BE CONTROLLED! Modern Dust Control Systems, as designed by PANGBORN engineers, will trap dangerous dust at its source, . . . and collect it for salvage or disposal. Let us study your Dust problems and make you a proposal—NOW. No obligation at all.

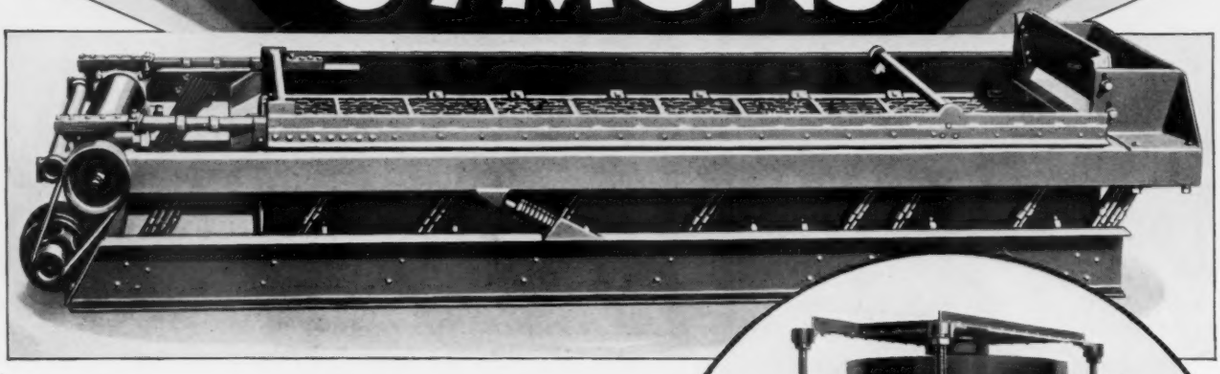
Write today to P. O. BOX 8507

PANGBORN

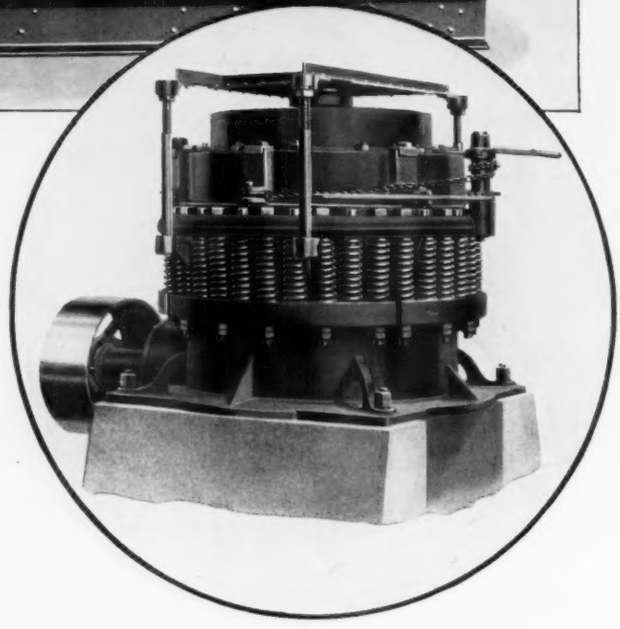
The World's Largest Manufacturers of Blast Cleaning and Dust Collecting Equipment

HAGERSTOWN · · · · MARYLAND

For Better SCREENING and Finer CRUSHING you can depend on SYMONS



Every producer of screened materials recognizes the advantages of a level screen.



For fine crushing, the Symons Cone stands without an equal.

It is almost ten years since the first Symons Cone was placed in service. During that period, they have gone into most of the major plants where fine crushing is done in quantity.

Just as outstanding as was the Symons Cone in crushing, so is the Symons Screen in screening. Operating on a different principle, it delivers better graded sizes that meet today's rigid specifications.

To be assured of the best in crushing and screening equipment, let us tell you how your problems can best be solved with Symons.

NORDBERG MFG. CO. MILWAUKEE, WISCONSIN

NEW YORK CITY
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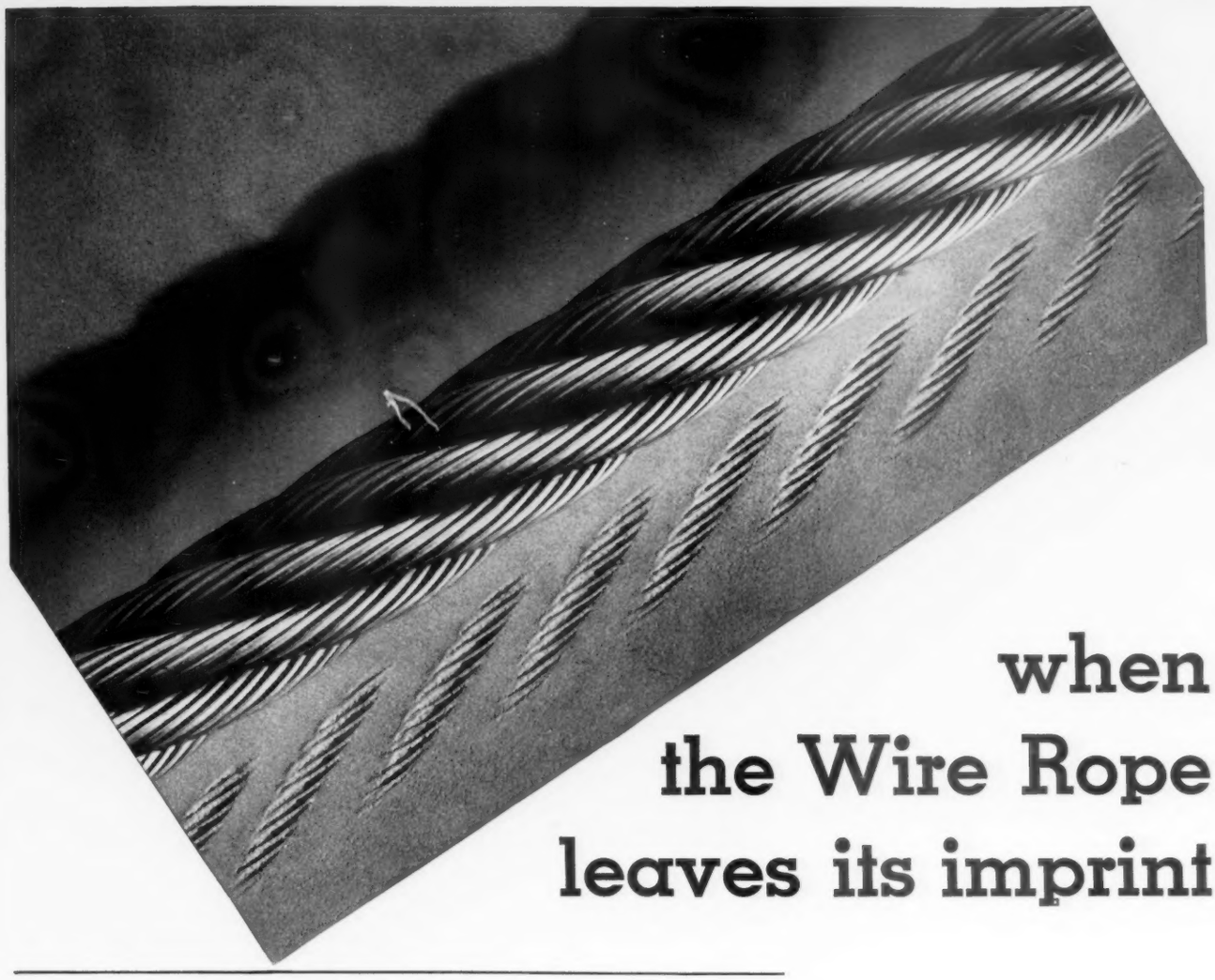


when the Wire Rope leaves its imprint

Know your Ropes ...This is a helpful hint, how to make wire rope last longer. Subsequent Wickwire Spencer advertisements in this publication will give other dollar saving information. Tell us about your rope problem and we will give you the answer.

If there is an imprint of the rope in the sheave or drum groove there is a filing action on the rope at every start and stop. Furthermore, when a new rope is installed of a different lay pattern, these impressions have a tendency to injure the wires in the outer strands. Both conditions materially shorten rope life. Grooves having the slightest impressions should be machined and polished. We will gladly send you a table of maximum and minimum tolerances to consider when regrooving and suggestions of metal to use for sheaves and drums. Write your request for information.

•

WICKWIRE SPENCER STEEL CO., New York City; Buffalo, Chicago, Worcester; *Pacific Coast Headquarters:* San Francisco; *Warehouses:* Portland, Los Angeles, Seattle. *Export Sales Dept.,* New York City.

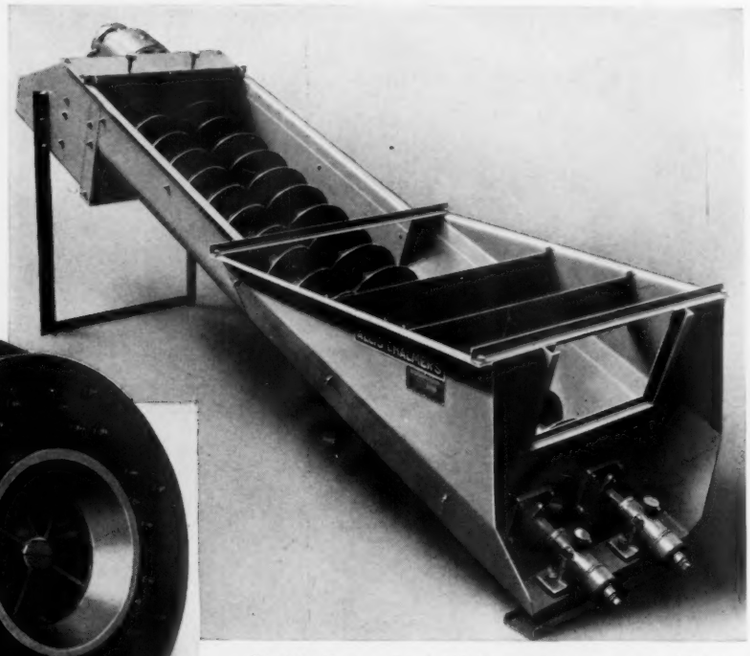
WIRE ROPE
by Wickwire Spencer

BOTH...STANDARD LAY AND WISSCOLAY PREFORMED.

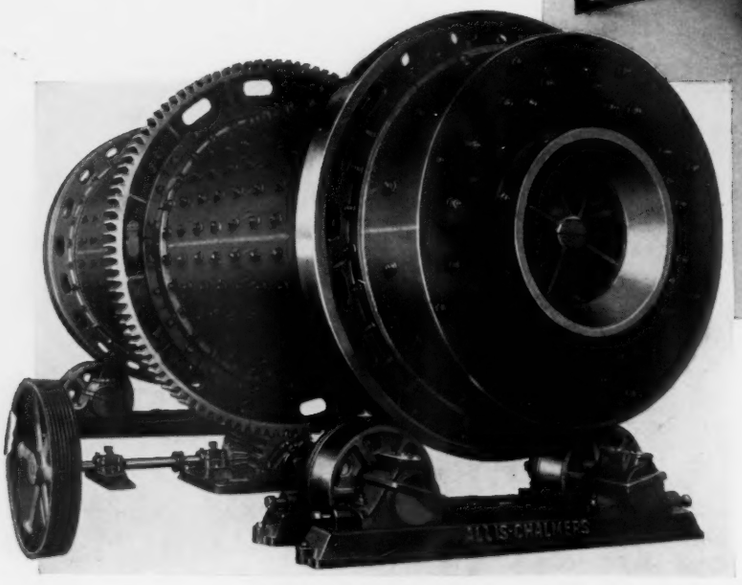
Wickwire Spencer manufactures all sizes and types of Wire Rope in standard lays and preformed. Wisscolay preformed wire rope will often solve a wire rope application difficulty. Ask our engineers where and when it should be used. Send for a free WIRE ROPE BOOK. It will prove of great value.

If Washed Aggregates are Necessary

Call on ... Allis-Chalmers



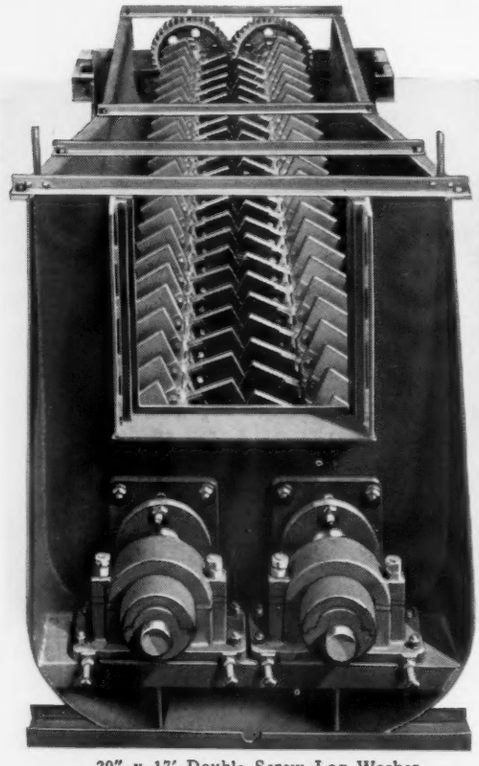
Double Screw Sand Washer with Gearmotor Drive. Washers can also be supplied with sprocket and gear drive.



Revolving Stone Scrubber

THE selection of the proper equipment to produce clean aggregates requires careful consideration, whether it is for a plant which has been operating dry or for a new washing plant. The experience of the Allis-Chalmers Manufacturing Company in the manufacture of equipment required for plants producing commercial aggregates dates from the industry's infancy, and this experience is reflected in the design and application of its products.

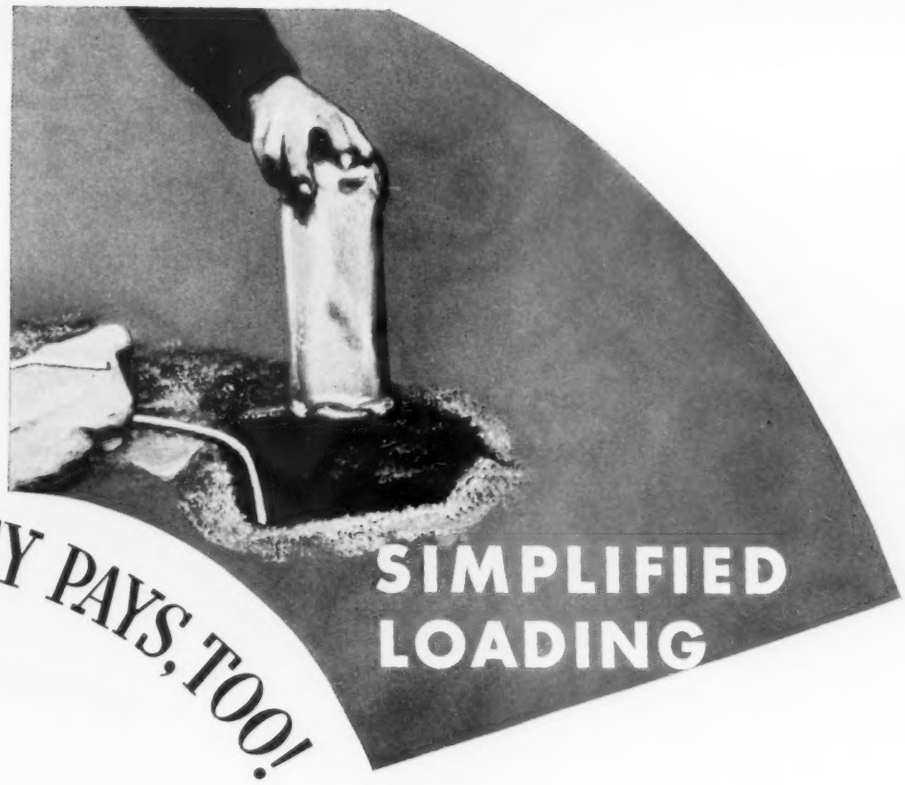
Allis-Chalmers builds a complete line of scrubbers, log washers, sand washers, scrubber screens, and vibrating screens, especially designed for washing aggregates. As each has its particular application we suggest you call on our nearest district office for further information.



20" x 17' Double Screw Log Washer for stone and gravel.

ALLIS-CHALMERS

Allis-Chalmers Manufacturing Company, Milwaukee



SIMPLICITY PAYS, TOO!

● Simplified loading is a large cost saver in big shots and a worth while one in little ones, too.

Here's all there is to it:—Pass one end of the Cordeau-Bickford detonating fuse through a cartridge and lower to the bottom of the hole. Load and tamp. Connect each hole with wrap connections to the main lines of Cordeau. Finally—when all connections are completed—cap the end of the main-line Cordeau with an E. B. Cap or Fuse Cap, and fire all holes at the same time.

Note that there is only one connection to be made at each hole no matter what its depth, or number of broken charges. Much time and labor are saved right here. And if giant blasts are used in place of numerous small blasts, one's equipment can stay in place until all drilling is completed, instead of being constantly shifted around.

These are worth while savings of which you should take advantage. Yet this is only one of the five ways in which Cordeau-Bickford will save you money. Write us and learn the other four. THE ENSIGN-BICKFORD COMPANY, *Simsbury, Conn.* Estab. 1836.

CORDEAU
DETONATING FUSE
BICKFORD
ALSO SAFETY FUSE *Since* 1836

THE ENSIGN-BICKFORD COMPANY

CB-42

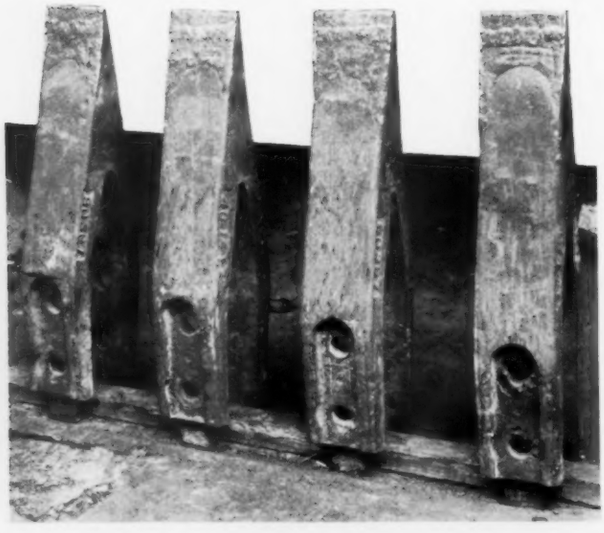
Rebuilt to Outwear the New

1 **2** **3**

Old Worn-out Pulverizer Hammer

Rebuilt with Work Hardened Nickel-Manganese

Completely Rebuilt, Work Hardened and Hard Surfaced



Set of Jumbo Size Digger Teeth, Weight 170 lbs. They cost new, $125.00 but they were rebuilt by McLean for $75.00—assuring two to four times greater service life, because the nickel-manganese steel was thoroughly work-hardened before the hard surface was applied.

THIS is a typical job of McLean Process Welding—a badly worn hammer head restored to full dimensions with a tool steel wearing surface ⅛" thick—3" face, 4" long—1 lb. or 25 sq. ins. of surface. By work hardening the base metal before applying the hard surface, the built-up portion is made super-tough all the way through, so that it will not crumble or allow the hard surface to crack or chip off, even under the continuous impact that high-speed hammers undergo.

RESULT: Rebuilt hammer good for 100% to 400% longer service than the original *for less than the cost of a new one.* That's real repair economy. The extra service you get from a McLean welded part more than pays for the job. Scores of plants are saving their worn-out castings from the scrap heap, and putting them back into use again, rebuilt with *work-hardened* nickel-manganese. Dipper teeth, crusher heads, conveyor screws, ring cutters, crusher gears and drag chains, are a few of the many items that are rebuilt by McLean.

Check over your equipment, and see if you need any parts rebuilt. If the work is light, ship it to us—or if it is heavy, or includes several items, we will do the job in your plant. *As a special offer,* we will rebuild, work-harden and hard-surface any worn set of dipper teeth, including freight both ways, for less than the cost of a new set. Let us prove the McLean Process to your satisfaction.

Write for Bulletin showing applications

McLean Welded Products Corporation

532 West 79th Street, Chicago, Illinois

CLAY DRYING WITH THE KILN MILL

Hammer-type Kiln Mill, a simple, practical, efficient unit for drying and pulverizing.

THE Raymond system of reducing the product and removing the moisture at the same time, with a single machine, is successfully applied in clay drying operations.

A recent installation consists of a hammer-type Kiln Mill with a coal-burning furnace unit for supplying hot gases to the system. It is designed to dry and pulverize a special type of fire clay.

The mill is equipped with a table feeder which sweeps the clay from the feed bin into the drying tower above the pulverizer. The clay as fed to the mill contains about 15% moisture. The Kiln Mill reduces the moisture content below 1% and grinds the material to a fineness of 85% to 90% passing 200-mesh, delivering approximately 4 tons per hour.

Both operations are done at once, shortening the time of process, eliminating separate dryers, and simplifying the handling of the material. The resultant savings greatly lower the cost of production, while the initial investment is much less than for the usual equipment.

Raymond Bros. Impact Pulverizer Co.

Division of Combustion Engineering Co., Inc.

1321 North Branch Street, CHICAGO

Sales Offices in New York and Los Angeles

Canadian Representative:

Combustion Engineering Corporation, Ltd., Montreal

Other applications of the Kiln Mill described in this 8-page Bulletin. Copy sent on request.

Remarkable economies shown in drying and grinding limestone, gypsum, bauxite and similar materials.

RAYMOND

PULVERIZING • SEPARATING • FLASH DRYING • DUST COLLECTING

MORE RUBBER ON THE ROAD!

GIVES YOU MORE TRACTION GREATER SAFETY—LONGER WEAR—AT HIGHER SPEEDS

FIRESTONE patented construction features enable us to give you a tire with higher shoulders —wider and deeper non-skid tread.

The cords in the body are Gum-Dipped, giving greater strength and longer flexing life.

The two extra layers of Gum-Dipped cords under the tread give a firmer union between tread and body which holds this heavy non-skid tread securely to the tire body.

Equip today with these safe and economical tires! You will get uninterrupted service, maintain faster schedules and get safety protection beyond anything you have heretofore experienced.

Call on the Firestone Service Store or Service Dealer *now* and start reducing your operating costs today.

•

★★★★★ *Listen to the Voice of Firestone — featuring Richard Crooks, Gladys Swarthout, or Nelson Eddy — every Monday night over N. B. C. — W E A F Network . . . A Five Star Program*

AUTO SUPPLIES FOR TRUCKS AND BUSES

FIRESTONE TRUCK TYPE BATTERIES

FIRESTONE HEAVY DUTY SPARK PLUGS

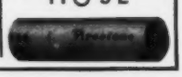
For Quick Starts, Longer Mileage

FIRESTONE BRAKE BLOCKS and HEAVY DUTY LINING

For Better Braking Control.

FIRESTONE FAN BELTS

FIRESTONE RADIATOR HOSE



Firestone

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VOLUME 27 NUMBER 11

Pit and Quarry

With which is consolidated

CEMENT-MILL & QUARRY

CHICAGO, MAY, 1935

1935 Lime Convention To Be Held June 19-20

CODE AUTHORITY WILL MEET

The National Lime Assn. announces that its Seventeenth Annual Convention will be held at the Homestead Hotel, Hot Springs, Va., on June 19 and 20 and extending through June 21 if necessary. One of the sessions of the convention will be given over to a conference of the lime industry during which all matters relating to the Code of Fair Competition and the extension of the National Recovery Act will be scheduled for discussion. A meeting of the Lime Code Authority will be held on June 17 and June 18 will be devoted to a meeting of the board of directors and executive committee of the association.

Cement Plant Improves Its Stone Department

★ The Bessemer Limestone & Cement Co., Bessemer, Pa., has completed the rebuilding of its stone crushing and handling department. Improvements included the rebuilding of the stone storage and the installation of new belt conveyors and a Dixie hammer-mill.

Otho M. Graves Appointed to Mines Advisory Board

Twenty-nine leaders of the mining and allied industries have accepted invitations from the Secretary of the Interior to act as an Advisory Board to the Bureau of Mines. The purpose of the board is to advise the Director of the Bureau, Dr. John W. Finch, on matters of Bureau policy affecting relations with industry.

The Bureau of Mines is a government agency that aims to serve all interests concerned with minerals. It is thought that such a Board will be of invaluable aid to the Bureau by offering suggestions that might guide its activities toward a more effective service to the mineral industries. The exchange of views may lead to concerted action toward a better organization of the business of mineral production and a clearer conception of the economic problems affecting the industry.

National leaders of labor organizations were asked to serve on the Board, in view of the vital interest of workers in the Bureau's activities designed to improve health and safety conditions and to promote the prosperity of the mineral industry. Otho M. Graves, president of the General Crushed Stone Co., Easton, Pa., represents the non-metallic mineral industries on this board.

Members of the Advisory Board are designated to serve for a period of one year. The first meeting of the Board was held in Washington April 15.

Eastern Producer Builds New Crushed-Stone Plant

★ The Reading Quarry Co., Temple, Pa., late in April completed the erection of a new crushed stone plant. Equipment installed includes a revolving screen, a 150-hp. Westinghouse motor and a single-roll McLanahan crusher. Installation of additional equipment will be made at a later date.

Illinois Mineral Interests Schedule Annual Meeting

The annual conference of the mineral industries of the state of Illinois will be held May 17 and 18 at Urbana, Ill. Among the organizations cooperating in this conference are the Midwest Agricultural Limestone Institute, the State Dept. of Mines and Minerals, the American Institute of Mining and Metallurgical Engineers, Illinois Chamber of Commerce, etc. A session devoted to nonmetallic minerals and their products will be held May 18 and will be presided over by W. R. Sanborn, Lehigh Stone Co., Kankakee, Ill. A session in the afternoon of May 17 will be devoted to trends in the utilization of mineral products.

Kentucky Rock Asphalt Makes Plant Betterments

★ The Kentucky Rock Asphalt Co., has just completed an extensive improvement program at its plant at Kyrock, Ky. Equipment installed includes a Williams hammermill, three Tyler Hum-mer screens and a Jeffrey hammermill.

★ The Universal Atlas Cement Co. has installed a Wagner Turbidimeter in its plant at Leeds, Ala.

Operations in Cement Industry Up in April

INDICATE GAIN OVER LAST YEAR

The rate at which cement plants are resuming operations indicates that cement production for the month of April was probably far in excess of that month in the preceding year. Among the many plants which resumed operations in April are: Alpha Portland Cement Co., Jamesville and Cementon, N. Y., Ironton, O., and Manheim, W. Va.; Ash Grove Lime & Portland Cement Co., Chanute, Kans.; Consolidated Cement Corp., Fredonia, Kans.; Columbia Cement Co., East Fultonham, O.; Dewey Portland Cement Co., Dewey, Okla.; Glens Falls Portland Cement Co., Glens Falls, N. Y.; Lehigh Portland Cement Co., New Castle, Pa.; Lone Star Cement Co., Hudson, N. Y., and Bonner Springs, Kans.; Manitowoc Portland Cement Co., Manitowoc, Wis.; Marquette Cement Mfg. Co., Cape Girardeau, Mo.; Medusa Portland Cement Co., Bay Bridge, O.; North American Cement Corp., Alsen, N. Y.; Northwestern States Portland Cement Co., Mason City, Ia.; Petoskey Portland Cement Co., Petoskey, Mich.; Standard Portland Cement Co., Painesville, O.; Universal Atlas Cement Co., Hudson, N. Y.; Wolverine Portland Cement Co., Coldwater and Quincy, Mich. Many other plants, including that of the Lehigh Portland Cement Co., Mason City, Ia., plan to resume operations during May.

Pennsylvania Stone Plant Being Completely Rebuilt

★ John S. Teeter & Sons, Inc., Gettysburg, Pa., are rebuilding their crushed stone plant. A Farrel primary crusher, Kennedy-Van Saun reduction crusher and 4-deck Kennedy vibrating screen are being installed.

C. C. Beam, owner and operator of stone quarries at Melvin, Ohio, and a gravel plant near Sligo, Ohio, has purchased the stone crusher and quarry operated by George Hyer of Washington C. H., Ohio.

★ The Duval Texas Sulphur Co., Houston, Tex., is reported to have completed its new $500,000 sulphur plant near Boling, Tex.

Aggregate Bodies File Petition With I. C. C.

PROTEST EMERGENCY CHARGES

The National Sand & Gravel Assn., in cooperation with the National Crushed Stone Assn. and the National Slag Assn., has filed a petition with the Interstate Commerce Commission seeking a reconsideration of the decision of the Commission as it relates to the products of the three industries and a cancellation of the emergency freight charges. A recent order of the Commission, issued on April 23, vacated their order denying certain petitions which had been submitted earlier. One of the petitions which was denied in the April 17 order (which order is now vacated) is that filed by crushed sand and gravel and slag producers in the southeastern territory.

The decision of the Interstate Commerce Commission in Ex Parte 115 limits the allowable increases in freight rates to 7 per cent. Therefore, the 1c. per 100-lb. limitation—2c. in the case of special sand and gravel hauled in box-cars and in the case of naturally-bonded molding sand, however hauled—does not become operative except in cases where 7 per cent. of the present line-haul rate exceeds the limitation of 1 or 2c. Thus, a rate of $1.01 per ton may be increased only 7c. per ton. In the case of a $3 rate 7 per cent. would be 21c. per ton, and the Commission's order would limit the increase to 20c. a ton in the case of those commodities to which the 1c. limitation is applicable.

New Crushed-Stone Plant Is Being Built in East

★ Herbert Gingell, Fairfield, Pa., is proceeding with the erection of a new crushed stone plant at Gettysburg, Pa., which is expected to be in operation late in May. Equipment will include Good Roads 3-deck and 2-deck vibrating screens and a bucket elevator of the same make. Champion primary and reduction crushers and revolving screen will also be installed.

Institute of Quarrying to Hold Annual Meeting

The Institute of Quarrying, London, England, announces that its Seventeenth Annual Conference, to be held June 17 to 20, inclusive, at Buxton, Derbyshire, England, will be a World Congress as well. With this in view invitations have been sent to organizations in various parts of the world and delegates will represent many foreign countries as well as the United States. The program includes visits to some of the largest quarries in the Derbyshire district and in other parts of England and Wales.

Papers to be presented will include "Observations on the Crushed Stone Industry of America" by W. E. Farrell of the Easton Car & Construction Co., and "Quarrying of Limestone in America" by Dr. Oliver Bowles of the U. S. Bureau of Mines.

Zanesville Gravel Co. Is Building New River Plant

★ The Zanesville Gravel Co. of Dresden, Ohio, is constructing a sand and gravel plant on the Muskingum river near Conesville, Ohio. The plant will be operated by steam and electric power and will have a capacity of 750 to 800 tons per day. The plant is being built to furnish material for the Wills Creek dam.

Two Large New England Stone Companies Merge

Announcement was made April 1 of the merger of the Connecticut Quarries Co., Inc., and the New Haven Trap Rock Co. into one consolidated corporation known as the New Haven Trap Rock Co. The main office of the new corporatin is at 67 Church St., New Haven, Conn., which was the former address of the two separate companies. The officers of the new organization follow: Clarence Blakeslee, president; Harold L. Blakeslee, Albert L. Worthen and William E. Hilliard, vice presidents; George E. Hall, secretary; Ray J. Reigeluth, treasurer; Albert L. Worthen, general manager; Harold L. Blakeslee, assistant treasurer.

New York Stone Producer Adds Bituminizing Plant

★ The Plattsburgh Stone Products Co., Plattsburgh, N. Y., has completed the installation of a new 2-ton capacity Cummer aggregate-bituminizing plant.

I. C. C. Orders Railroads Pay Silica Reparations

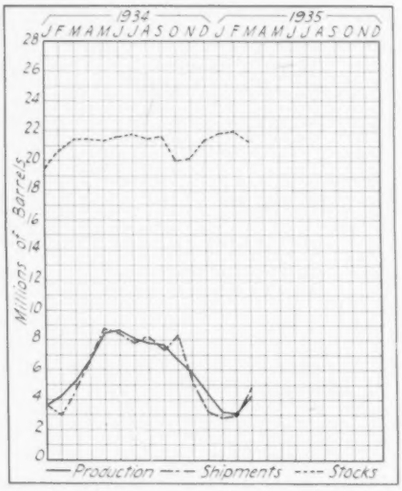
Under orders from the Interstate Commerce Commission, eight railroads have been ordered to pay $148,528 in reparations, plus interest at 6 per cent., to certain Indiana firms as an overcharge in freight rates for a period of two years ending September 8, 1922. The first request for freight rate reductions was on silica sand shipped from the Ottawa (Ill.) sand district. The I. C. C. granted the freight rate reduction on silica sand in 1929 but refused reparations. The counsel for the Indiana State Chamber of Commerce obtained a rehearing, resulting in the final order, which also authorized further reductions.

The T. J. Hall Co., at the foot of Baymiller St., Cincinnati, O., has purchased from the Ohio Gravel Co. the plant which it sold to them several years ago. One boat will be operated on the river, the same as before the merger. Officers are: F. E. Hall, president; D. P. Hall, vice president; G. M. Estes, secretary and treasurer.

Cement Shipments Show Gain Over 1934

FIRST QUARTER SHIPMENTS FALL

The Portland cement industry in March, 1935, produced 4,299,000 bbl., shipped 4,877,000 bbl. from the mills, and had in stock at the end of the month 21,319,000 bbl. Production of Portland cement in March, 1935, showed a decrease of 18.2 per cent. and shipments an increase of 5.6 per cent., as compared with March, 1934.



Portland-Cement production, shipments and stocks by months in 1934 and the first three months of 1935.

Portland cement stocks at mills were 0.5 per cent. lower than a year ago. The total production for the first quarter of 1935 amounts to 10,554,000 bbl., compared with 13,204,000 bbl. in the same period of 1934 and the total shipments for the first quarter of 1935 amount to 10,675,000 bbl., compared with 11,348,000 bbl. in the same period of 1934; decreases, respectively, of 20.1 and 5.9 per cent.

The statistics here given are compiled from reports for March, received by the Bureau of Mines, from all manufacturing plants except one, for which an estimate has been included in lieu of actual returns.

New Company Takes Over Former Queen City Plant

The newly organized Remington Stone and Gravel Co. of Cincinnati, Ohio, with a capital of $100,000, has taken over the properties of the defunct Queen City Crushed Stone and Gravel Co. James L. Radabaugh is the head of the new company.

★ J. W. Brannan Sand & Gravel Co., Denver, Col., has installed a new Pioneer Gravel Equipment Co. shaker screen.

★ The Piru Rock Co., Piru, Cal., has completed improvements to its crushing, screening and washing departments. New equipment includes a small locomotive and cars.

Residential Building Permits Up in March

HIGHEST FOR MONTH SINCE 1932

March awards for residential building construction almost doubled the volume reported in February, according to F. W. Dodge Corp. At the same time the residential total exceeded the March, 1934, volume by almost 15 per cent.; in fact the March, 1935, contract volume for this class of construction, the Dodge organization reports, was the highest recorded since March, 1932, when the total for the 37 eastern states was only one million dollars greater than the volume of $32,207,400 reported for last month.

For the first quarter of 1935 residential contracts totaled $71,234,400 in the area East of the Rockies. This was a gain of almost 23 per cent. over the total for the first quarter of 1934; incidentally an increase over the first quarter of 1933 of almost 78 per cent. was shown while as compared with the corresponding period of 1932 the current year's first quarter total was about 16 per cent. smaller.

Total construction awards during March in the 37 eastern states amounted to $123,043,500. Besides residential building this volume included $44,581,600 for non-residential buildings, $39,779,400 for public works; and $6,475,100 for public utilities. The March contract volume for all classes of construction recorded a gain of 64 per cent. as compared with the February volume of $75,047,100. Compared with the total of $178,345,800 for March of last year, however, a loss in excess of 30 per cent. was registered.

For the first quarter of 1935, total awards amounted to $297,864,500 in the 37 eastern states as against $461,525,800 for the corresponding quarter of 1934. In this connection it should be recalled that a year ago the PWA program was approximately at its height.

Estimate $79,000,000 For New York Highway Work

The New York State Construction Council has made an estimate of the amount of money that will be expended on highways and grade crossings in that state. New York's share of the $800,000,000 appropriated for this purpose under the relief bill is estimated at $28,325,000 for highways and $20,790,000 for grade crossing elimination. Additional funds from the state budget total $23,287,000 and the regular Federal Aid fund is $6,300,000.

Pennsylvania Stone Plant Improvement Under Way

★Narehood Brothers, who operate a quarry in Limestoneville, Pa., are making approximately $18,000 worth of improvements in their plant. Two large belt conveyors are being installed and other additions to the equipment will be a triple-deck vibrating screen, 4-ft. Symons cone crusher, and a double-deck Niagara screen.

Announce Annual Election R.M.C. Code Authority

The annual election of the seven regional representatives on the Code Authority for the Ready Mixed Concrete Industry will be held in Washington, D. C., on May 31, 1935, at the office of the Code Authority, 951 Munsey Bldg. Ballots will be counted at 2:00 p.m.

Ballots setting forth the candidates nominated for each region have been mailed to all known members of the Industry with a transmitting letter announcing the date the election will be held and urging an early return of all ballots. Any person or company whom the Code Authority has unknowingly omitted or who for other reasons failed to receive a ballot or needs an additional ballot, may obtain such ballots for their region as they may need by addressing a request to the Code Authority. Those who fail to receive their ballots through the regular channel are urged to make their requests promptly.

Indiana County Throws Out All Non-Code Bids

The commissioners of Randolph County, Ind., recently threw out all bids for gravel for county use when it was found that none of the bidders had signed the NRA code governing the industry. Bids are to be readvertised at a later date.

Code Authority Calls "Code Price" Improper

The Code Authority of the lime industry has drawn attention to the fact that the use of the terms "code price" and "code prices" is improper as the code does not establish any price. Each member of the industry is entitled to determine his own pricing policy and to sell on that basis, provided he has complied with the code's price-filing provisions.

Medusa Plant Completes 7th Accident-Free Year

For the sixth consecutive year the Medusa Portland Cement Co. plant at Silica, O., has been awarded the safety trophy of the Portland Cement Association. On April 5 this plant completed seven years of operation without a lost-time accident, one of the outstanding records in the cement industry.

★The Mobley Construction Co., has completed the construction of a new sand and gravel plant at Newport, Ark.

1935 P&Q Handbook and Directory Available

LISTS CONTRACTOR-PRODUCERS

The 1935 issue of PIT AND QUARRY HANDBOOK AND DIRECTORY, a completely revised edition, is being distributed to administration and production executives in the nonmetallic-mineral industries. The new volume is the largest to appear in recent years and contains 750 pages bound in cloth.

Many new types of equipment, designed for more efficient and lower-cost production, are described and illustrated for the first time. Every important process in crushing, sizing and washing aggregate and in manufacturing cement, lime, gypsum and ready-mixed concrete is described in full, and much space is devoted to the problems of designing plants for economical production.

The Directory section contains an alphabetical list of non-metallic-mineral producers and a geographical (state-and-town) list of more than 5,000 plants. Contractor-producers, who are subject to the provisions of the crushed-stone, sand-and-gravel and slag code and are registered under it, are included for the first time.

The book is distributed without charge to nonmetallic-mineral executives and superintendents who request copies.

Aggregate Associations to Fight U. S. Competition

The National Sand and Gravel Association has appointed a committee of five members to work with a similar committee of the National Crushed Stone Association in combating governmental competition. Members of this committee are: E. Guy Sutton, Chairman, L. T. McCourt, R. J. Potts, Eric Ryberg and Wm. Stoner.

Sell Linwood Cement Co. Property and Equipment

The Linwood Cement Co. property and equipment was sold on April 8 to the Liquidation Corp. and Henry Horst for the sum of $150,000. The Liquidation Corp. and Mr. Horst held judgments against the cement company amounting to $176,793.74, in the form of promissory notes. The cement company has one year in which to redeem its property.

★The Arkansas Portland Cement Co., Okay, Ark., has completed the installation of a Northern Blower Co. dust-collecting system in the finish-grinding department of its plant.

The slate industry's rules for uniform credit and contract terms and sales practices have received N.R.A. approval.

Editorials

On Extending the N.I.R.A.

THE last two years have wrought many changes in the minds of men and not the least of these in the minds of business men. During that period we have become accustomed, even though not perhaps reconciled, to a form of economic control that was new to most of us and certainly foreign to the principles of unrestricted individualism on which American life had been founded. At first it was difficult, and probably in most cases impossible, to view the proposals of "new deal" measures with anything even approaching an open mind.

Today, after nearly two years of theoretical discussions of the aims of those measures and after more than a year's experience in operating business enterprises under government supervision and code guidance, it is possible to find many men whose views have undergone a complete transformation, whose attitudes have become more or less attuned to the social and economic thinking that inaugurated the Administration's program.

Two years ago it would have been impossible to collect such an array of intelligently-formed and lucidly-expressed opinions as is presented elsewhere in this issue. Prejudice, to say nothing of intellectual unpreparedness, stood in the way. To-day it is not only possible but relatively easy to do so, because of the broadening of viewpoint and the convictions born of experience that have since become evident.

In the symposium referred to thoughtful members of our industries speak their minds on this supposedly-new venture in government supervision of private enterprise. Some of them believe that it is inherently wrong in principle and unworkable in practice. But most of them express themselves as in general accord with the principles, although not approving all the activities based on them or designed to effectuate them. Through many of the opinions favoring extension of the National Industrial Recovery Act in some form runs the conviction that conditions have changed and that new methods are needed to deal with them, a conviction that is so well expressed by the producer who writes: "I am firmly convinced that industry organization and group coöperation under codes (or cartels) is definitely in the cards for the future. Things have got too congested and too complex for the old methods of unbridled competition and unlimited individualism."

In this issue are reprinted only a few of the numerous informative letters received. Many of the others deserve as much space as is given those published herein and, should we be able to reproduce them later, will prove to be as full of interesting views and experience data as are those of the present collection. As the attentive reader will discover, those favoring an extension of N.I.R.A. principles recognize their value, even while admitting what are sometimes their inadequacies and sometimes their misapplications, and express the belief that enough gains have been established to warrant further trial and development.

However, there is no need to attempt a *résumé* or an interpretation here; the writers speak for themselves. Their letters disclose the well-considered opinions of men who have observed at first hand the operation of business under code regulation and who feel justified in expressing their convictions, whether favoring or opposing extension. Many of the writers have realized that the reasons underlying their opinions are more important than their views themselves, and their letters have required, and have been allotted, space accordingly. We consider it a privilege to be able to present such an important collection of opinions on a subject that deserves frank and careful discussion.

The Durable-Goods Industries

THOSE who have contended that there could be no substantial recovery of general business—and, by the same token, no marked reduction in unemployment—until after a revival of the durable-goods industries must be comforted by the rapidly-growing record of increasing sales of mechanical equipment for plant-modernization purposes. This revival has, of course, not been confined to any single industry. Indeed, it has been far more widespread than is generally known. In our own industries, for example, the published record of equipment purchases as provided by the news pages of PIT AND QUARRY from month to month—although but a fraction of the total for our own field—has given repeated and growing evidence of the increasing demand for new machinery both for the building of new plants and for the improvement of old ones.

Much of the early buying of equipment, especially such as was made necessary among those who benefited first from the government's public-works program, centered on used machinery and meant little to equipment makers beyond indicating a revival of demand and the existence of purchasing power of a kind. This buying began late in 1933 and rose in volume to considerable proportions. As the available supply of used machinery was increasingly drawn upon and as less and less of it came upon the second-hand market, machinery manufacturers began to feel the first effects of renewed new-machinery buying. By the end of the second quarter of last year the record of only the largest sales in many lines of industry demonstrated beyond doubt that the long-awaited recovery of the durable-goods industries had already begun.

From many selling centers come reports to the effect that 1934 was the best year since 1930, and

that the present outlook for further improvement seems encouraging. The demand for labor-saving machinery has been greatly stimulated by the rise in labor costs, which has been in itself both a sign and a result of general business betterment. Plant-improvement programs recently inaugurated by large concerns in numerous different industries total hundreds of millions of dollars, much of which will be spent for the products of our industries as well as for those of machinery manufacturers.

The improvement in the durable-goods industries has been gaining momentum for nearly a year and, although still below the expectations of those who depend upon the demand for durable goods, has given them the encouragement and definite results they so badly needed.

Our own industries share deeply in whatever improvement occurs in the durable-goods industries and can not be indifferent to their condition. Their revival may not be the key to general business recovery but there is no question of the importance of those industries in the industrial soundness of the country. Producers in our industries who purchase new equipment now not only better their own production facilities but they contribute materially to the restoration of a class of industry whose prosperity is a large factor in the prosperity of the nation as a whole.

The Revival of Building

LARGE sections of our industries continue to look forward to a revival of the building industry, which is being accelerated by the assistance offered by the Federal Housing Administration, as a market for a large share of their products. In order to encourage the building of residential structures some producers have announced reductions in material prices of as much as fifty per cent., hoping in this way to widen the present market for housing materials.

Different explanations have been offered in an attempt to account for the slowness with which building construction is recovering. The prevalent opinion seems to hold the high cost of labor responsible; while the rising cost of materials is held accountable by others. We have never felt that either explanation was in itself satisfactory, and data recently collected by the Standard Statistics Company seem to support this belief.

The investigation made shows that the index of wages in the building industry stood at about 93 in 1934, related to a base value of 100 for 1926, while the index of material prices was approximately 86, thus seeming to fortify the opinion of those who complain of high labor costs. However, a closer study of the data reveals that wages have been practically stationary since the end of 1932, while material prices have risen steadily since that time. During the period of prosperity, extending from 1926 to, say, the beginning of 1930, wage rates rose while material prices declined, wages then standing at approximately 107 and material prices at 85, compared with 1926 levels. By the middle of 1931 wages had reached 109 and material prices had declined to 82.

If we relate 1934 labor and material costs to their "peak" values, irrespective of when these "peaks" occurred, we find that the 1934 wage-rate index of 93 was 85 per cent. of the "peak" value of 109 in 1931. The 1934 material-price index of 86 was exactly 86 per cent. of the "peak" value of 100 in 1926. Viewed in this light, the off-"peak" decline in wage rates is almost the same as that in material prices. This is due to the remarkable recovery in prices which has occurred since the middle of 1933 and which is attributable largely to the effects of code operation in the building-material industries. Despite the serious decreases in cement and lumber prices, the average of all building-material prices is above the average price level for all commodities.

Wage rates fell from the "peak" of 109 in 1931 to a "low" of 92 at the close of 1932, yet building construction showed no signs of recovering. Material prices dropped from the 1929 "peak" of 96 to a "low" of 70 in 1932, yet building was not stimulated by the fall. Neither decrease seemed to have any effect in checking the continuing downward trend in building activity. There seems to be a growing realization that reduced labor costs and reduced material prices will not of themselves stimulate building construction. One of the writers whose letters appear in the symposium presented in this issue emphasizes the truth of the second half of that statement when he says, "We know that even if cement were shipped at no charge whatever, there would be little increase in building." Although he offers no suggestion as to what would encourage building, he may share the general—and, we believe, erroneous—view that lower wage rates would accomplish it.

Building has failed to revive because of a lack of money with which to finance it. Into the field of private home-building the Federal Housing Administration has injected the much-needed stimulant of financial aid, and the results are already apparent. What can be done to increase activity in other types of building construction, particularly in the fields that are still overcrowded, certainly is not yet apparent, and will not become so as long as most real-estate securities continue to give their owners no income. Until the increase of purchasing power—both individual in the case of residential space, and corporate in the case of business space—can absorb existing facilities, there will be no incentive for investors to lend money for the provision of needless buildings.

In our judgment financial assistance is the only sound method of hastening the recovery of all types of building construction, and this the Federal Housing program provides. Any immediate expansion in the market for building materials seems to be dependent on help of that kind, rather than on decreases in wage rates and material prices. Producers of building materials can contribute most toward furthering construction activity by aiding the government in its efforts to give home-builders financial assistance. We see no other favorable prospect for a revival in building.

The Portland production plant. Derrick at left unloads from barges to plant.

The Bonneville storage plant with mixing plant and cableway in background.

Finished Material for Bonneville Dam Taken Forty Miles to Storage

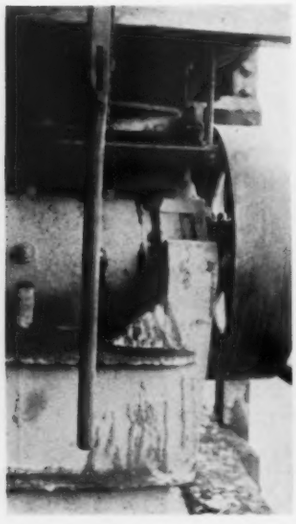
Barge, Conveyor, Railway, Cableway and Cement Pumps Provide Transportation

By HENRY W. YOUNG

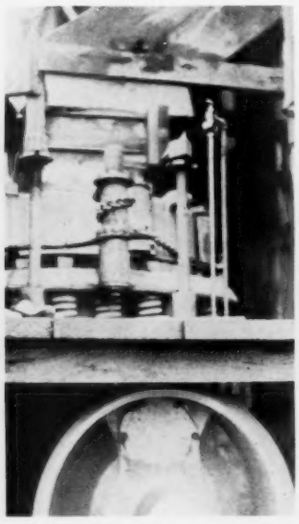
THE Bonneville Power and Navigation Project of the Public Works Administration, one of the most important of the many huge projects undertaken by that body, was authorized on September 26, 1933. The sum of $31,250,000 has been allotted, and about $3,500,000 more will be necessary to provide locks for sea-going vessels instead of barges only, as well as some changes in the fishways. The tremendous salmon runs each year up Columbia River represent an industry of many millions of dollars annually, which must be conserved.

The work is being carried on under four main contracts. The first is the main spillway dam between the Washington shore and Bradford Island, which will be 1,200 ft. long with a 900-ft. spillway crest and 50-ft. by 50-ft. vertical spillway gates. The dam will be 180 ft. thick at the base and 170 ft. high from the lowest foundation level. There will be about 96,000 cu.yd. of "A" concrete and 500,000 cu.yd. of "B" mass concrete in the dam and apron.

The power-house substructure and navigation locks represent a second phase, located on the Oregon side of the river. In this there are 200,000 cu.yd. of excavation. Concrete will be placed for the power-house substructure for six units and draft tubes for two, and for the navigation locks. All told, 200,000 cu.yd. of concrete will be needed

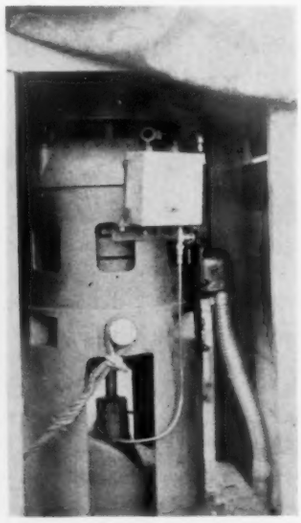


The 10-in. by 36-in. primary jaw crusher.



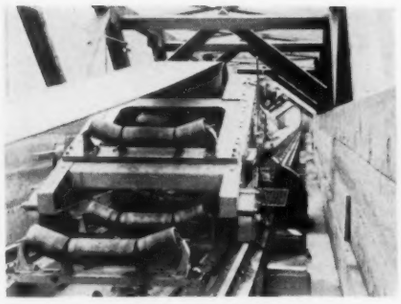
The 3-ft. cone secondary crusher.

The 451-ft. conveyor distributing to storage.

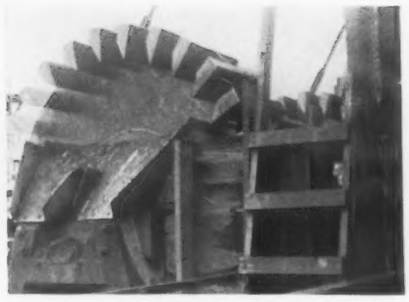


The deep-well pump supplying wash water.

The cross conveyor from elevator to conveyor over storage.



The traveling tripper which distributes material to storage.



The revolving classifier used in Portland production plant.

here. The ultimate output of the plant will be between 432,000 and 578,000 kw. and the head about 50 ft.

The other two phases include the relocation of the Seattle, Portland & Spokane Ry. on the Washington side and the Oregon, Washington Railroad & Navigation Co. line on the Oregon side. Analysis of the situation from the standpoints of materials available, costs of production and transportation, climatic conditions, etc., led finally to the location of the production plant on Willamette River in Portland, Ore., somewhat over 40 mi. from the dam site.

Gravel and some sand are procured by two dredges operating at various locations in Willamette River from 2 to 4 mi. above the production plant in Portland. The larger of these dredges is known as

Truck hauling 35-cu. yd. trailer carrying 61-ton load. The outfit rides on 26 tires.

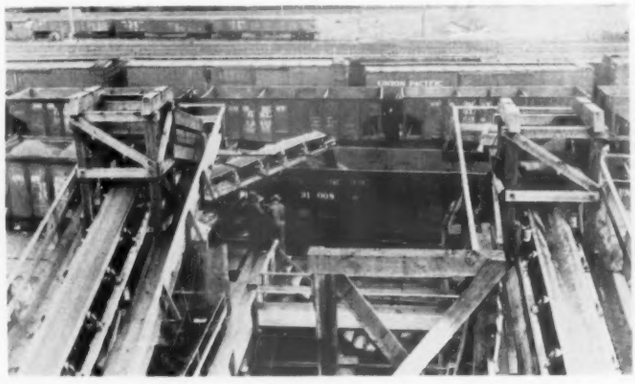
the *Black Prince*. It is equipped with an Owen 3-cu.yd. clam-shell bucket and an American Hoist & Derrick Co. 2-drum hoist. The smaller dredge usually operates in close proximity to the *Black Prince* and is equipped with a 2½-cu.yd. Williams clam-shell bucket.

Since the Willamette River material does not have the requisite amount of fine sand, a sand-sucker type dredge is employed, and is located in a slough near the junction of Willamette and Columbia Rivers. This secures what is known as Columbia River sand. This dredge is known as the *Sandy* and has a capacity of 250 cu.yd. per hr. of saved material, running in size ⅛ in. and below. The suction has a depth limit of 53 ft. and is operated by a 10-in. Byron-Jackson centrifugal pump which is primed by means of a Baker rotary vacuum pump and is driven by a 75-hp. Fairbanks-Morse semi-Diesel engine.

Sand and water from the main pipe-line are discharged into a screen-bottomed hopper. The oversize materials are carried out of the hopper by the wash, the saved material passing through the screen and falling into a tilting, steel-lined chute through which it passes by gravity to the barge alongside. This chute is provided with five loading gates placed at equal intervals in the bottom to allow discharging the sand evenly over the barge. Barges transport these materials to the plant.

The materials are unloaded from the barges by a Williams 5-cu.yd. clam-shell bucket on a stiff-leg derrick having a 120-ft. boom. This delivers them direct to a bin over the grizzly in the case of the sand and gravel and to a separate bin in the case of the sand. From the grizzly the 4½-in. oversize goes to one bin and the "fines" to a second bin. The oversize then passes through a 10-in. by 36-in. Wheeling jaw crusher, from which it is returned to the barge for rehandling and again comes to the grizzly, where it is able to pass through with other "fines" to the bin. The "fines," including the crushed material, are next taken by a 4-ft. by 6-ft. Stephens-Adamson apron feeder to a Link-Belt bucket-elevator. The materials are then delivered to a 5-ft. by 14-ft. Telsmith revolving screen. This first takes out the 3-in. to 1½-in. sizes, which are delivered to bins. There remain "fines" and oversize, which take separate routes through the plant.

The oversize first passes through a 3-ft. Symons cone crusher, after which it is taken by a Link-Belt bucket-elevator to a 3-ft. by 8-ft. Allis-Chalmers,



Belt-conveyors feeding two swinging loading conveyors at Portland plant.

One of the double-deck vibrating screens used in Portland plant.

The 5-ft. by 14-ft. revolving screen which performs first separation of materials.

Two double-deck vibrating screens used for fine sizing and washing.

three-deck vibrating screen, which delivers, aside from the "fines," ¾-in., 1½-in. and 3-in. materials, from their respective bins. The ¾-in., 1½-in. and 3-in. materials, from their respective bins, are then passed through Telsmith radial gates to a 30-in. belt-conveyor, which delivers them to a Stephens-Adamson swing belt-conveyor that is arranged for two-track operation and to carry them direct to gondola-type cars. The cars are moved along and "spotted" as filled by a motor-operated winch. The Columbia River sand is also delivered from its bin to cars through the same radial gates, conveyor and swing belt-conveyor.

The materials coming into the 5-ft. by 14-ft. Telsmith screen, as well as the "fines" leaving it, are washed. Incidentally, also, the materials are washed before entering the three-deck vibrating screen above mentioned.

The "fines" from the Telsmith screen, after washing, are taken by two Stephens-Adamson double-deck vibrating screens which produce three grades of materials: ¾-in. to ¼-in., "fines," and +⅜-in. to ¾-in. The first of these passes to a bin, from which it may be delivered to the cars or to storage, as required. The +⅜-in. to ¾-in. material passes directly to the ¾-in. bin before mentioned as following the three-deck vibrating screen.

Finally, the "fines" from the 2-deck screens are passed into the classifier, which also receives the "fines" from the 3-deck screen. This classifier is of the revolving type, built by the General Construction Co. under the Perkins patent. It consists of two wheels about 10 ft. in diameter, carrying on their peripheries a series of buckets. It revolves so as to dip into a tank into which the "fines" are sluiced. These rise under the buckets with a violent turbulent action. The buckets in effect skim up the mud, silt and fine material below ¼-in. mesh, carrying them up and over and discharging them at the top position on the wheel to sluices that discharge to waste.

The material that is left, of ¼-in. mesh, goes to a bin and from thence to another set of Telsmith radial gates, which deliver it to a 30-in. belt-conveyor and from there to another Stephens-Adamson swing belt-conveyor delivering to cars.

This plant is built wholly of timber supported on piles. It is designed for 24-hr. operation, practically all products going directly to the cars, as there is storage space available for not more than two or three car-loads of each product. The normal capacity is sixty 40-ton cars in 24 hr. Electrically-driven throughout, all the operations are controlled from a single point at track level. Republic rubber belting is used on all conveyors and, with a few exceptions, Allis-Chalmers electric motors are used throughout. Falk speed reducers and Allis-Chalmers "Texrope" V-belts are used for power transmission.

After the aggregates have been prepared they are transported by railroad in 60-car trains to the storage plant on Bradford Island adjoining the power-house excavation. The materials could not be sent by barge since the current of the Columbia is too swift, particularly near the site of the dam. The railroad transportation cuts across the third side of a triangle and represents the shortest and quickest method of transportation to the storage plant.

Arriving at Bonneville, the aggregates go directly into open storage of 16,000-cu.yd. capacity for the use of the general contractors on the power-house substructure and navigation locks. This plant can handle 250 cu.yd. of material per hr. It was designed in its entirety by H. W. Sharp, of the H. W. Sharp Co., engineer and machinery distributor of Portland, Ore. All the machinery entering into it was furnished through the H. W. Sharp Co. in conjunction with the Balzer Machinery Co., also of Portland. Republic rubber conveyor belting is used in this plant also. Dodge-Timken idlers are used and power is furnished by Allis-Chalmers motors and Falk motor reducers.

For furnishing concrete to these two phases of the development, the aggregates-storage plant, the batching-and-mixing plant, cement-handling and storage facilities, Chain-Belt "Rex" Pumpcrete

Operating floor in mixing plant, showing batchers, scales, control board and graphic recorder.

plant and form shop have been erected on Bradford Island. And from that central location a double cableway stretches across the pit, which is the power-house substructure excavation, to the main shore. Railway extensions bring all the materials and equipment to the island in the midst of these activities.

Aggregate materials as brought from the Portland production plant are dumped from the railroad gondola cars into a 1-car capacity track hopper and are fed by a pan conveyor to a 10-in. by 36-in. bucket-elevator which lifts them 80 ft. to a cross conveyor. This inclined cross belt-conveyor is 30 in. wide and feeds another 30-in. conveyor over the storage. The discharge from this conveyor to the pile is accomplished by means of a 30-in. Dodge tripper, self-propelled, hand-reversed, friction-drive, tank type. The sand piles are canvas-capped to prevent the sand from taking up an undue amount of water.

Extending the full length of the storage piles is a tunnel, containing a 30-in. conveyor on which the materials from the piles are discharged by means of 19 radial arc gates. This tunnel conveyor discharges on a 30-in. inclined conveyor leading to the concrete plant.

Cement is delivered in bulk by railroad cars to a steel storage-tank or silo located near the batching plant and having a capacity of approximately 15 car-loads. The cars, standing on a side track alongside, are unloaded by means of a manually-operated drag-line scraper into a hopper. This hopper delivers the cement to a Fuller-Kinyon pumping unit located in a concrete compartment under the tank. This unit delivers the cement either direct to the batching plant, or to the storage-tank above. It also delivers cement from the tank to the batching plant through an underground pipe-line.

The concrete batching-and-mixing plant stands on the edge of the cliff nearly above the power-house excavation on Bradford Island. It has a capacity for producing 2,000 cu.yd. of concrete a day. The centrally-located cement compartment has a capacity of 750 bbl., and the six radially-disposed aggregate bins a total capacity of 1,200 tons.

Aggregates are fed to the mixing-and-batching plant by the inclined belt-conveyor, which dumps at the top of the bin into a distributing chute that sends the sand and stone to the desired compartments of the bin. Three sizes of stone and two grades of sand pass over this belt and are stored in the several compartments of the bin. There are bin indicators to show when the cement compartment is full or empty. These show at the cement silo and at the mixing operator's station. Water comes from the water tank just west of the mixing plant.

On the batching floor are the weigh-batchers, the control station for the entire mixing plant, the recorder, and an office for the government concrete engineers. There are seven C. S. Johnson weigh-batchers, five of 50-cu.ft. capacity for sand and stone, one of 30-ft. capacity for cement, and one with a capacity of 180 gal. for water. These batchers are air-operated, with electric interlocks, and weigh automatically. The accuracy is within 1 per cent. for each material. The interlocks on the batchers prevent any material from entering the mix without being weighed, and provide for the discharge of any overloads. Each batcher is provided with four beams, so that four different classes of concrete can be batched, as the engineers direct. These are class A, B, and C concrete, and grout. These classes of concrete are obtained by the mixing-plant operator moving one air valve to the proper notch. As long as the proportions of water, cement, sand and stone in these A, B, C and grout classes remain fixed by the engineers, no changes of the sliding weights on the beams need be made. Thus the scale settings remain fixed and there is less need for tampering with them.

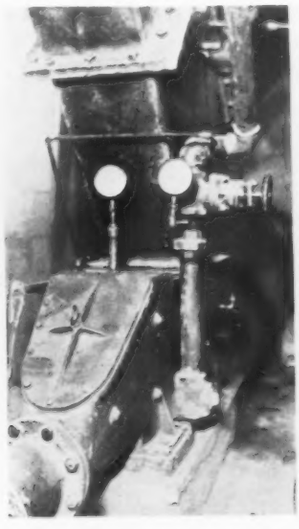
The moisture content of the sand and stone is frequently tested by the government engineers. When a change in the moisture content occurs, allowance is made on the water batcher and on the sand and stone batcher. Each batcher is provided with graduations on the beams for moisture. A

(Continued on page 60)

The cement-storage silo at the mixing plant.

The batching and mixing plant at the dam site.

Locomotive with dump car at concrete plant.



The pump which handles cement to silo or plant.

Should the N.I.R.A. Program Be Extended?

A Symposium of Opinion on the Value of Governmental Coöperation with Business

WE firmly believe that the N.R.A. law should be extended. We think its great weakness is lack of prompt enforcement of compliance. We are firm believers in minimum wages and maximum hours if properly administered, and with enforcement of compliance it would check wasteful competition and help restore national confidence.

By minimum wages I mean maximum standard wages below which employers in our industry may not go, and by maximum hours the maximum number of hours per week beyond which an employer may not work his men, except in emergency, and then at time and a third. I mean that the industry should pay the maximum wages and work the maximum of hours that the industry can afford.

There are many violations of the fair-practice provisions of our industry's code both as to wages and hours and the fair-practice provisions.

Of course, there has been an increase in production costs and an increase in employment, no increase in price, and reduced profits.

In and of itself it has not checked new-plant construction. What has checked new-plant construction is the economic situation and the lack of profit in the business. We certainly favor the extension of the general principles of the law. [*Crushed stone*]

* * *

WE would like to see the N.I.R.A. extended. Before the recovery act our business was demoralized, especially on account of cut-throat competition, but since then prices, to a certain extent, have been stabilized. We would like to see the law made more drastic, as there is still more or less "chiseling."

As to labor relations, we have been benefited by the act, as we always paid better wages than our competitors, and since the N.R.A. went into effect, it has forced our competitors to pay the same scale of wages.

Last year, on account of the act, we were able to show a small profit, whereas for several years previous we showed a loss. [*Sand and gravel*]

* * *

WHILE I believe it is quite true that N.I.R.A. has been of some benefit to some industries and while it may have been of benefit to the cement industry, I, personally, have not favored the idea from the beginning. This is my personal, not official, view. I was sure from the beginning and I am surer now that the fundamentals of the NI.R.A. are unsound, impracticable and unworkable. It is argued by some that N.I.R.A. creates monopolies and crushes out small enterprises. This may be true in some cases but in other cases it operates against large companies and in favor of small ones. The minimum-wage provision is illogical and inconsistent. The territorial boundaries are inconsistent and not properly placed. They largely disregard local conditions. Industry generally does not desire to oppress labor but to compel increases in wages and reduction in hours inevitably increases cost, raises the selling price and narrows the market and therefore reduces production, necessitating another journey around the circle. The N.I.R.A. is inconsistent with the A.A.A.

The selling price for cement . . . is not too high. The present selling price with present volume enables only a few favorably situated companies to make any earnings, notwithstanding huge losses during 1931, 1932 and 1933. Yet there are some who say that if cement were reduced in price there would be a large increase in volume. We know that even if cement were shipped at no charge whatever, there would be little increase in building. There are other reasons with which you are familiar which prevent building.

I do not think the N.I.R.A. has increased purchasing power. It has not reduced unemployment or checked wasteful competition in my opinion.

The cement code was partially suspended in January, 1934, a month after it was approved and, notwithstanding constant effort, a substitute for the suspended section has not yet been approved. . . . [*Cement*]

* * *

FROM my personal observation of the National Industrial Recovery Act, as it affected our industry locally, the wages paid to labor were increased substantially because common labor is not organized in this locality and labor accepted work at almost any wages offered. Employment has been increased slightly, but production is so far below normal that very few producers have been able to work more than three or four days a week. Production costs have increased, due to the increase and stabilization of wages.

Before our code became effective under N.I.R.A. competitive conditions were such that stone was being sold far below the actual cost of production and it was a question of how long the concerns could continue to exist. The open-price provision in our code has stabilized prices at a level which, although still below normal, will allow a small profit where the volume is sufficient. This has resulted in the small producer making greater headway than the larger producer toward recovery.

In this locality we are all hopeful that the act will be extended. We believe that the labor provisions, fair-practice provisions and the open-price provision as written in our code should all be retained. The leaders in the industry have given freely of their time and thought to make the act beneficial. It would be breaking faith with industry for the government to fail to extend the law after having forced industry to find a means of self-government and a method for overcoming the destructive competitive conditions which were prevalent in our industry. [*Crushed stone*]

* * *

IT is easy to see now that all of us had our expectations entirely too high in the summer of 1933, when we began our efforts to effectuate for our respective industries the provisions of the N.I.R.A. We were very sick, and as is always true with human nature we were looking for a cure-all, forgetting for the time being that anything that really claims to be such is necessarily largely a "quack remedy." Now, and for the past several months, we are undergoing the reaction, and, running true to form, we have swung to the other extreme and are just as uniformly underestimating the value of the national effort under N.I.R.A. Some are going to the extreme of saying that it has made no contribution, and a smaller number still further in claiming that it has been an actual detriment. No doubt it will never be possible to appraise with exact accuracy the total net effect of N.I.R.A. Nevertheless, I am firmly convinced that it is a fact, and will be so recorded in history's appraisal, that the national effort made under N.I.R.A. has been a tremendous contribution, first toward stabilization, and then toward recovery. It is difficult for me to visualize just what might have come to pass in business and industry without it.

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ON this and the following pages appears what is certainly a remarkable and also, we believe, a representative collection of the opinions of nonmetallic-mineral producers on the advisability of extending the principles of the National Industrial Recovery Act. Naturally, these letters are only a selection of the many received—a lack of sufficient space having made it impossible to publish all—but in no other important respect has the editor exercised the rights of suppression or deletion.

The writers of these letters were asked to express themselves freely and fully and were assured of the protection of privacy. Their letters display a sincerity, a knowledge of conditions and a frankness of expression that are arresting and convincing. Most of the few deletions that are indicated were made to insure anonymity.

Some of the letters are very long—longer than are commonly written by busy business executives—but their very length indicates their writers' estimates of the importance of the subject. There is some repetition to be found among them, but this is evidence of the increasing agreement that has developed on basic points rather than of a careless iteration of ordinary and ill-considered views.

In selecting these letters from the scores that were written to him, the editor scrupulously endeavored to preserve the ratio of affirmative to negative opinions as shown by the total response. He tried also to maintain the relative weight of the responses from each industry having a code of its own. The scarcity of replies from some industries must be accounted for not only by the differences in the number of companies in those industries but also by differences in the importance attached by them to code problems and N.R.A. operations in general. The symposium includes opinions from large, small and medium sized producers, as these terms are commonly used, and represents every important producing section of the country.—EDITOR.

N.I.R.A., and its agent N.R.A., has unquestionably been of benefit to our own company and to our industry as a whole throughout the Southwest. As a brief general statement it may be said that total wages have been increased; employment has been increased; production costs have been proportionately increased; and that average sale prices have increased just about enough to take care of these increased costs with the same percentage of profit margin. Competitive relationships have been tremendously improved. Co-operation and proper trade practices have improved. New productive facilities have not been restrained, and it is possible that some new facilities were installed immediately after approval of our code in an effort to "beat the gun" and get into production before "permissive" areas might be declared. I doubt if it can be positively asserted that such new installations have occurred exclusively for that reason, though circumstances furnish at least persuasive evidence.

I strongly favor a two-year extension of the act, keeping it as nearly like the present act, so far as fundamental principles are concerned, as may be practicable in view of governing court decisions. The cry that N.I.R.A. has lent itself to the establishment of monopoly or to the oppression of the small man is one hundred per cent. bunk so far as our industry in this part of the country is concerned. I make the same statement insofar as my observations have gone in our own industry outside of this particular region, as well as for other lines of industry with which I am more or less familiar.

I would particularly wish to include in the new bill the present exemption from the anti-trust laws. The truth is that our devotion to the so-called anti-trust laws, both national and state, has become a kind of fetish which we blindly worship—some marvelous formula of miraculous virtue too sacred to be criticized, much less altered. The truth lies largely in another direction, and the supposed evils of trusts and monopolies will, as Theodore Roosevelt said, be entirely prevented or cured by complete publicity. N.R.A. furnishes us a perfect channel for all necessary public information. Public opinion may be safely relied upon to stop and to punish evil practices of any kind of which the public is given full knowledge.

It may be frankly admitted that N.I.R.A. not only has failed to come up to our too optimistic expectations but that it has also failed to achieve anywhere near the benefits of which it was really capable. This failure is in some measure chargeable to industry itself, being poorly organized and unschooled in the arts of coöperation and self-government. This is not surprising because such teamwork has been taboo under our competitive system and our anti-trust laws.

But the failure to accomplish what should be done has quite naturally been much more largely due to incompetency and inefficiency of the administrative work within N.R.A. Please note that I said naturally due. We were again over-optimistic when we expected that, within a few months' time, an administrative organization could be thrown together that was even approximately competent to make all the policies, pass on all the codes, and other formulæ, and attend to all administrative details arising from our multitude of complex industries. We have necessarily had probably a majority of our administrative personnel undertaking to pass on industry problems concerning which they had not the slightest knowledge or previous training. This is not necessarily criticism of the President, nor even of Hugh Johnson or of the present recovery board. We were just in that kind of fix, we tackled that kind of problem, and we should be fair enough to recognize that eighteen months or two years is a totally inadequate period of time to permit of more than a mere start in accomplishing an industrial and economic revolution such as was here involved.

You will see that my remarks imply that the changes brought about or contemplated under N.I.R.A. are not entirely concerned with the emergency of the present depression. The emergency rushed us into it, but I am firmly convinced that industry organization and group coöperation under codes (or cartels) is definitely in the cards for the future. Things have got too congested and too complex for the old methods of unbridled competition and unlimited individualism. [*Sand and gravel*]

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I AM very definitely of the opinion that the N.I.R.A. should not be extended. I am firmly convinced that the code . . . forced on industry have made a nation of cheaters, and have caused the moral breakdown of industry. I refer not only to employers, but to employees. In my opinion it is much more detrimental than any advantage that has resulted from it.

As far as our plant is concerned, the N.R.A. has increased our labor costs fully 100 per cent., but as far as I can find out, it has not improved the mental attitude of the employees, because their pay check at the end of the week has not been increased.

The effect of increased costs of labor, plus the Government's opening up of pits or leasing of deposits for use of contractors, has not helped to increase our earnings.

I would abandon the National Recovery Act. Any law that is kept alive by dodging the issue in court, and which threatens industry for failure to comply, but does not enforce compliance because the authorities know they can not enforce compliance can not stand up. It works only to the benefit of the "chiselers." As to myself, I have made my last complaint to the code authorities. My method of beating "chiselers" is still the old one of cutting prices, though they be posted below the total costs.

I do not believe the law has increased general purchasing power; to the contrary, it has been detrimental. In our business it has perhaps given us some little paving, but not any large amount.

I have under my supervision businesses other than the sand-and-gravel business, but I can not see that they have been improved by the N.I.R.A., with the exception of oil production. The oil producer has benefited. On the other hand, the refiner has been hurt. The warehouse business, in which I operate, has been very definitely hurt.

Numbers of failures to live up to the various codes have come to my attention. The restrictions of the codes are almost as bad as the restrictions placed upon a pedestrian in a large city. He is liable to arrest in crossing the street at the wrong time, but I think I do it every day, in front of a policeman, and I don't get arrested.

A year ago you could walk down the streets in the cities and see N.I.R.A. signs in every window. Today nobody pays any attention to it. It is the great American habit of making laws. What we need is fewer restrictions, and the will of industry to deal fairly, and this can not be done by the legislatures passing on to the hands of authorities, who are continually changing and uncertain of their position, numerous restrictions of daily business routine. [*Sand and gravel.*]

* * *

I THINK, on the whole, I favor the extension of the general principles of the law; certainly not as a permanent institution—not necessarily for two years, but while the *emergency* exists. . . .

We have tried sincerely to carry out the spirit of the code and have a very loyal bunch of employees, so our relations with labor are harmonious.

We had a good volume of business last year, so that we worked on an average around 48 hr. per week; this meant time and one-third for 8 hr. overtime; consequently the men made very fair pay and this naturally contributed not a little to their satisfaction.

It did increase the labor cost to us, but the increased volume was sufficient to overcome that by cutting our overhead so that the total cost was satisfactory. Prices were good and we made some money.

Competitive relations were vastly improved.

The "permissive" territory offered as a check to new-plant construction proved a dead letter. None was granted in [the state] where all our plants are located, and while it was granted in [an adjoining state] for three months which expired in February, it has not been as yet renewed, so no one knows where they are and no benefit has accrued.

Apparently, N.R.A. has come to the conclusion that it can not control intrastate business, and does not intend to attempt further control. I doubt if similar state laws will be enacted; therefore, we may be put to serious loss if we, as interstate operators, are controlled by N.R.A. regulations, while our competitors, doing a strictly local business, are not subject to similar restrictions.

There was all too much bally-hoo in the Federal control last year and too much impractical stuff by Madam Perkins and her kind.

There has been a tendency toward recovery in our business; unemployment has been reduced and wasteful competition considerably checked.

There have been a surprisingly small number of violations of our code in our region.

The cost of administration of our code has been excessive and wastefully unnecessary.

I am not too sure just how we stand today as compared to the position we would have occupied had there been no N.R.A. and no codes, but I am ready to give N.R.A. considerable credit. I really think, too, that we have been particularly fortunate in our district and received more than average results.

You can see that I have not too firmly arrived at a definite conclusion as to N.R.A., but feel like giving it the benefit of any doubt and trying it another year, though somewhat worried over its apparent lack of control in intrastate cases. [*Crushed stone*]

* * *

I AM not at all in sympathy with the present-day trend of interference with private enterprises, and regard it as being the most sinister influence that is on the business man's horizon today. However, until we develop some leader who can surround himself with advisers who will afford him a program which will promise the benefits without the detriments that our present program affords, I believe it would be the height of folly for any individual or group to interfere with the President's program.

The code as applied to industries such as ours, which have their own townships and afford a decent and economical living condition for their employees, is a distinct hardship because it raises our pay-rolls to the point that competition with larger plants located in higher-priced industrial centers is lessened.

The tendency towards encouraging any and all classes of labor to organize has a very detrimental effect upon their *morale*.

Competitive relationships have not been benefited because of the tendency to "chisel" on the part of the inconsiderate producer, and the threat of collapse of the entire program automatically prohibits any sane executive from entering into comprehensive plant construction. However, I am firm in my belief that our general condition is better than it has been, and that the N.I.R.A. or some other effective plan is absolutely necessary, if we are to pass through this era without internal convulsions. I reiterate that my position is this: until some better vehicle is found we had better stick to the plan as outlined, modifying it where necessary and expanding it where beneficial. [*Crushed stone*]

WE are producers principally of steel-foundry molding sands and are operating four plants. . . . Our production is seasonal due to the practice of most of our customers of taking in their winter requirements before severe weather sets in. We accordingly run at a peak during September and October, shipping our customers' winter requirements and laying in large inventories to take care of sales for the ensuing four months, so as to enable us to defer resuming quarry operations until the weather is favorable in the spring.

Our plants are quite removed from towns or even villages of any size and our employees, most of whom have been with us for a number of years, are part-time farmers who in any case raise a large part of their year's vegetable requirements. With many of them their sole cash income is derived largely from us.

We have not been able to confine our operations to a 40-hr. week. At one of our plants we are now running 72 hr. a week, with two crews, each working 6 hr. a day for 6 days. The amount of available work during an 8-months' operating season would probably only provide a total of 5 months or 22 weeks steady pre-code employment per man. With a 40-hr. maximum we have been compelled to recruit additional labor of a poorer class. In the absence of an *average* 40-hr. week allowance, our men are not permitted to make up time lost through shut-downs due to weather, mechanical difficulties or fluctuations caused by the seasonal characteristics of our business. We can, it is true, run at a fairly uniform rate producing material for inventory. This necessitates additional handling at a cost of 9c. or 10c. a ton. In short, with a 40-hr. maximum restriction, it is subjecting us to considerable additional expense and unduly reducing the earnings of our regular employees. We are paying considerable amounts for overtime. So far we have not been able to obtain approval of the open-price policy for industrial sands.

We are observing the code strictly in all respects. We have good reason to believe that some of our competitors are not paying code wage rates and are not complying with the 40-hr. maximum restriction. We have no enforcement machinery functioning as some of the code administrations do, wherein a representative makes routine calls at the plants to check on code compliances.

We approve of the established wage rates which are in line with what we paid prior to the N.R.A. act. Those of our competitors whose selling prices were lower than ours, have somewhat increased their prices due in part to having brought their wage scales in line with ours.

I would like to see some features of the act continued with respect to trade practices, the open-price policy and the minimum hourly rates. In my opinion we should be permitted an average 40-hr. week over a 6 months' period.

I believe it is the general consensus of opinion of producers of industrial sand, that the costs of the code administration and the tonnage assessments are far out of line with the results accomplished. Too much is being undertaken which is of no importance and in my opinion could be dispensed with. [*Molding sands.*]

* * *

I FEEL that the act was framed with the best of intentions and, further, that it would work if it was constitutional and was, therefore, enforceable. Unfortunately, the N.I.R.A. has been used by different elements in Washington to further their own interests and the Administration's apparent attitude toward industry in the beginning has so complicated matters that it is hard to see where the credit belongs, and equally hard to see where the blame should be placed.

Our labor relationships have not been improved, our production costs have been higher, our competitive relationships are better, prices have been better maintained, but, owing to Government competition in our business, profits have not been commensurate with the trouble of complying with the code.

I, personally, favor the extension of the general principle of the law. Any modification should be toward permitting industry to govern itself, with proper Government supervision to prevent monopolies, and industry should be run by people who understand the needs of the industry, and not by some clerk who has never had any experience in any industry.

I do not think the law has increased purchasing power at all. In my opinion, practically all the buying being done now is being done with money that the Government has put out to the farmers and to the unemployed. I do not see that it has reduced unemployment, but it has checked some wasteful competition. I do not believe it has helped to restore national confidence. I do not know of many violations of the fair-practice provisions of my industry. In fact, the *bona fide* members of the industry seem to be in most cases conforming to the rules of the code.

It is my personal opinion that we will never take care of the unemployed—and that, to my mind, is the most important question before us—until we get them back to the country, where they can be taught to raise food and at least feed themselves, pending readjustment of industry, and possibly of our philosophy, and readapt themselves to the probably permanent change.

There are too many people in relief work who are depending on the Government for a job for us to hope for any permanent program from them, as it is not human nature voluntarily to give up a Government job unless we have something better and of a permanent nature. [*Crushed stone*]

* * *

THIS law has been one of the greatest laws ever passed in this country. It has helped us in labor relations, employment, production costs, prices, profit making, competitive relationships and the checking of mass production in our line which already suffers from overproduction. By all means, we favor the extension of this wonderful law.

We know positively that this law has increased the general purchasing power in this section of the country, and that it has assisted us in the recovery of our business. It has reduced unemployment, and has checked w a s t e f u l competition. [*Crushed stone*]

* * *

MY ideas on the subject of N.I.R.A. are about as follows:

(1) Labor relations—no change.

(2) Employment has been increased about 30 per cent.

(3) Production costs have been increased approximately 30 per cent.

(4) Selling prices have been increased probably 10 per cent.

(5) Profit making is about the same as before N.I.R.A.

(6) Competitive relationships have been wonderfully improved due to contact with competitive producers by reason of various code activities, committees, etc. We believe the greatest value derived from N.I.R.A. is closer competitive relationships.

(7) New-plant construction has not been affected at all.

It appears to this writer that it doesn't make much difference whether the act is extended or not. The worst competition we have absolutely ignores all the principles of our code, including hours and wages. The higher class producers have abided by the code and all its requirements. The cut-throat chiselers have disregarded it altogether.

The act has increased general purchasing power. It has reduced unemployment and has helped national confidence. The fair-practice provisions of the code have been locally and wantonly violated by the majority of the producers. If the Code Authority and its agencies try to enforce the fair-practice provisions, the N.R.A. administration [walks (?)] out on us and will do nothing.

The N.I.R.A. and an extension would be extremely beneficial to our industry if enforcement could be had, but without enforcement it doesn't make much difference whether the law is extended or not. [*Sand and gravel*]

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THE first year of the N.I.R.A. brought us a stabilization of prices that showed us a fair profit, but the "chiselers" have been taught all the tricks and it is almost impossible to land any contract of major importance at the filed prices.

We now find that all our men are being forced to join the unions, and that the unions will undoubtedly become the dictators in our business.

We have had no business recovery as the only jobs we have furnished were P.W.A. or on work financed by the government.

There have been plenty violations but no prosecutions. The only matters that we can obtain a citation on are wages and hours.

We are just about fed up on code assessments and secretaries. [*Sand and gravel*]

* * *

I AM quite sympathetic to the fundamental thought and principle expressed in the Recovery Act. I have felt that way since it was first proposed. The application of these principles to our industrial life has met with great opposition and discouragement, and I doubt if anyone can say that it has been anywhere near the success that many of us hoped it would be. American industry has grown up during the last few generations on entirely individualistic lines. We all dislike being told what to do. We are not going to be regimented easily. I dare say, considering the background and history of American industry, that we could not expect any great measure of success in attempting to enforce self-discipline on every branch of industry throughout the whole country.

I think one of the principal mistakes was that the N.R.A. tried to codify every single American industry, and I feel that the new act, which will undoubtedly be passed between now and June, should drop the codes of all the smaller industries and the service industries. However, I expect that those which are dropped will be obliged to obey certain executive orders, concerning labor, both as to hours and wages. Our industry, which I am told employs over fifty thousand persons, even in times of depression, and which is also counted as a "basic" industry, should, in my opinion, be continued under the system of codes. There is little doubt in my mind that our code will continue with some modifications. The definitions should be revised to include only the industries which you and I know were expected to be included under the code, and the control of plant capacity, I think, will be dropped and it should be dropped. Many of us felt that the "permissive" area idea was one of the most important parts of the code, but, in the light of experience of the last year or so, many of us have changed our minds.

As far as our own company is concerned, we feel that we have benefited by the N.R.A. We think it has tended, not only with us but throughout the whole country, toward preventing that death-dealing cut-throat competition, which has wrecked so many industries in the past. I have but little sympathy with those who demand that any effort toward regulating competition is bad for America. The advance of the machine age, the application of machinery, and mass production in our industrial life have made some sort of control of competition absolutely necessary. Indeed, I feel this so keenly that I fear the whole future of our industrial life in this country depends upon honest and intelligent self-discipline by industry, so that we can continue to exist.

I was much impressed by Mr. Mehren's address in Chicago, along this line. I am not at all sure that the coöperative effort by business men, who regulate themselves,

can best be encouraged through the N.R.A., but I do believe that throughout the country the N.R.A. has helped the members of our industry to get together and recognize the other fellow's point of view, and to have a little more sympathy for the competitor than we had before. Another thing that I have in mind is that our industries, which are classed with the "durable-goods" and "basic" industries, are in far greater need of help than are the "consumer-goods" industries. I am, therefore, favorable to the continuance of the open-price policy in our code which, with all its weaknesses, I think is as good a scheme as has been devised. [*Sand and gravel*]

* * *

THE effect of the N.I.R.A. on our company's interests with regard to labor relations has been practically nothing; with regard to employment, a slight increase; production costs, a considerable increase; prices, stabilized under "permissive" area, practically no effect without "permissive" area; profit making, improved under "permissive" area, no effect without "permissive" area; competitive relations, . . . [reduced] confidence between competitors; checking new plant construction, some check under "permissive" area, no effect without "permissive" area.

Generally speaking, I do not favor the extension of the general principles of the law for the reason that it holds an umbrella over the weakling and does not permit things to take their natural course. . . . In my opinion our country has been on a big spree and instead of being willing to take the headache the morning after the night before, is taking aspirin and extra shots of stimulants which is merely delaying the headache and making it worse when it does come. It is impossible to make a law any stronger than the people who live under it as was well illustrated by liquor prohibition. It is impossible to set down rules and regulations for controlling all the details of business in this country without continual misunderstandings. [*Sand and gravel*]

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GENERALLY speaking, I think the effect of the N.I.R.A. on the crushed-stone industry has been beneficial. With respect to my own company, we have obtained no direct benefits from it, but we believe the indirect benefits have been sufficient to warrant us in hoping that it will be continued.

It has had no effect upon our labor relations for any of our employees connected directly with the quarries, but has affected our relationship with the men employed in the transportation end of our business.

It has not increased employment, because we have not had sufficient business to operate our plants more than the 40 hr. a week specified in our code.

It has not increased production costs, because prior to the enactment of the code we did not decrease our hourly rate of wages, and consequently were not affected by the minimums stipulated in the code.

It has not affected prices, because we have not been operating under the price-control features of the code. It has not affected our profit, because it has neither affected price nor production costs.

It has improved competitive relationships, due to the fact that an opportunity has been afforded for us to meet executives of other companies.

It has not checked new-plant construction, because, under business conditions as they have been, we would not have constructed a new plant whether or not prohibited by the code, and further the production-control features of our code have not been in force in this section.

I do favor extension of the general principles of the law. It would perhaps be well to modify it to the extent of removing all forms of direct price fixing, and perhaps some of the provisions for production control, but some means such as open pricing which will accomplish price regulation should be left. In my opinon the N.I.R.A. can not and will not work unless industry is to receive some compensating benefit to offset the general increase in cost, due to wage and hour regulations.

I do not know whether or not the law has increased general purchasing power. It has assisted in the recovery of the crushed-stone industry, and I believe of many other industries. In general, it has reduced unemployment, and made great strides toward checking wasteful competition.

Due to the fact that no proper means of enforcing compliance has ever been worked out, and to the fact that the N.I.R.A. has not been completely tested in the courts, there has resulted a great degree of uncertainty as to its future, and consequently as to what it may be expected to accomplish, and for these reasons, I believe that while, in it searly stages, it did not help to restore national confidence and had possibilities of going far in this direction, is not now contributing toward the restoration of national confidence.

My experience leads me to believe that major violations of codes are comparatively few and minor violations are many. Proper means of enforcement would go a long way toward stopping both. [*Crushed stone*]

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I THINK that N.R.A. should be extended for one and preferably for two years. This opinion on my part is based on the effect of the National Industrial Recovery Act upon the crushed-stone, sand-and-gravel and slag industries and has no bearing on any other industries. In fact, I believe that codes for some industries have been unnecessary and disadvantageous to the industries governed thereby.

In so far as my own company's interests are concerned, I believe that the provisions of the code have, on the whole, been beneficial to my company. We have operated in this vicinity under the open-price system and it is my sincere opinion that the provisions of the open-price system have been more beneficial to this company's small competitors than to this company itself.

I believe that the labor provisions of our code have not been especially beneficial to our employees. Most of our plants are segregated and outside cities. The men employed live in the vicinity of the plants, most of them have small farms, they recognize that the work is seasonal and desire to get in just as much time as possible during the operating season, which lasts from six to eight months. Limitation of hours per week has been a hardship on such men, rather than a benefit to them and has probably had the effect of straining our relations with labor somewhat.

There has been some increase in employment, that is, in the number of men employed, but not very much; this is due probably to the fact that we have not had sufficient demand for industry products to require plant operation much more than 40 hr. per week.

Production costs have gone up, due to increase in labor costs. Off-hand, the increase in the cost of labor has been around 20 per cent., with a resultant increase in cost of production of between 4 and 6 per cent.

Under the open-price system, our average prices for materials have not increased. We believe, however, that had it not been for the open-price system there would have been a decrease in average prices.

It is impossible for us to say whether profit-making has benefited by the code. Quantity is such a large factor in profits in our industry that the code can not do much without a considerable increase in demand. However, the fact that prices staid up undoubtedly helped in this regard.

Competitive relationships have certainly been made more pleasant by the existence of code provisions. Better understandings have resulted from the organization of the industries into regions, districts, etc., and the meetings of committees of such regions and districts.

It is my belief, but I have no figures to support the opinion, that construction of new plants has been checked even in those districts where "permissive" areas were not put into effect.

So much for specific opinions in regard to the business of my own organization. I have discussed code operation with a great many operators during the past year or two, and the consensus of opinon has been that great benefit has been derived from the code. The statistics gathered by the engineering and research division of the Code Authority indicate that the code has reduced unemployment and checked wasteful competition.

It is impossible for me to express an opinion as to whether the recovery act has helped to restore national confidence. Certainly it did for a while, but a reaction has set in and has gone a long way to offset the feeling of confidence which was engendered at the outset of code administration as it applies to all industries.

In my opinion there are many industries which, like our own, will be benefited by the continuance of their codes of fair competition in substantially the same form as that in which they now exist. Other industries should not have any code regulation and yet others should have a modified form of code to fit the conditions which have become evident during the past year or two of code administration. [*Crushed stone and sand and gravel*]

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I FAVOR the extension of the general principles of the law, provided that the law can be rewritten in such a way as to effectuate the promises that were made to industry when the law was first projected. We all know that since the inception of this law there has been a constant effort on the part of politicians and the administration to "chisel" industry out of first one and then another of the benefits given to it by this law. Witness first the obscure and misleading wording of Sec. 7-A and also the wholly unwarranted executive order of June 29, 1934, authorizing a 15-per cent. reduction in code prices to the government.

The N.I.R.A. has, on the whole, been a benefit to our company because of its effect in the elimination of unfair trade practices and so long as it can continue to exercise a restraining influence on such practices it will help all legitimate industry.

We are in favor of the provisions of that act which fix minimum wages and reasonable maximum hours, but we object most strenuously to the manner in which Sec. 7-A was designed and used to promote the interests of the professional labor agitator. Do not interpret this as meaning that we object to collective bargaining. We believe in this principle, but we believe most strongly that employees should be permitted to engage in collective bargaining as they themselves see fit without coercion from *any* source. The labor provisions of the act should be so written and so administered as to promote confidence between employer and employee. As it is now written and administered it does exactly the opposite. What I have read and experienced concerning the various labor boards leads me to the conviction that their whole procedure is based on the assumption that the employer is always wrong. Every bit of industrial progress that we have made in this country has been based on an employer-employee relationship that recognizes a mutuality of interests. The National Labor Relations Board, which is set up to administer Sec. 7-A of the N.I.R.A., appears to be doing everything possible to promote the interests of those who would set up a state of antagonism between employer and employee. If this is to be the keynote of any extension of the N.I.R.A. then I would say that industry and its employees would both be better off without it. [*Sand and gravel*]

N.I.R.A. has made no material difference at our company in our relations with labor. It has had a tendency, however, to make labor conscious of the fact that it might have some kind of collective bargaining, but it is not just sure of what kind. It has increased employment at the expense of our regular employees, and none of them are making more than enough to live on where the basis is 40 hr. a week.

Production as a whole is about the same, while costs are from 10 to 15 per cent. higher. Prices appear to be uniform in our industry, but profits are scarce and very hard to make. The relations between competitive companies and competitive materials are of the best, and if the codes accomplished nothing else, they have brought one producer in contact with another and perhaps eventually will establish a "Golden Rule in Business."

I do not think it has checked new-plant construction, but I think that has been checked by a low volume of business and high competition. When it comes to increasing the general purchasing power, I do not believe that has been accomplished, as one must make more than it takes to live in order to be able to spend money for anything else. Cut-throat competition has been checked to a large extent in the aggregate business, and I believe national confidence has been restored to some extent through the Codes, but if Congress does not very soon commit itself regarding N.I.R.A. after June 16, the good that has been accomplished will certainly be lost.

There have been a few cases of minor infractions come under our observation, but, as a whole, the code in general is being lived up to very well. [*Crushed stone*]

* * *

IT is my honest opinion that the code as adopted had no beneficial effects for the crushed-stone, sand-and-gravel industry, and was absolutely detrimental to labor. If our industry was operated for the entire year instead of being a seasonal business, it would perhaps have worked out advantageously from the point of view of employees. The season for the past few years has been confined to a few months' operation, depending upon certain local projects, and when we were only able to employ men 40 hr. a week and, say, for three or four months in the year, it did not give them a "break," whereas if we had been able to give them longer hours for the peak period they would have earned more over the 12-months' period and been very much better satisfied. No one could blame them for being discontented when they were forced to quit work at the end of their 40-hr. period and see an entirely new gang come on to finish out the peak of the week's operation. It divided the money up among more people, but it also threw our regular employees on relief pay-rolls as soon as the season was over, whereas if they had been able to get the benefit of longer hours and more money during the peak period, many of them would undoubtedly have been able to carry through on their own resources for the entire year. Generally speaking, industrious men much prefer to earn their own way rather than be dependent upon the relief agencies.

Some of the features such as limited hours for night watchmen, etc., are perfectly ridiculous, in my opinion. These jobs are usually filled by older persons who have had experience such as locomotive engineers, etc., who are out by age, have nothing else to do, and are perfectly satisfied to work 12 hr. a night for a reasonable wage, whereas under the code we were forced to alternate watchmen and the job was unsatisfactory to everyone.

I believe that had the law never been enacted industry would be farther along today, and we hope that it will be abolished and no new legislation to a similar end enacted. . . . [*Crushed stone*]

PERSONALLY, I find myself of two minds in regard to the National Recovery Act, as it applies to the codes under which we are working. I find that the benefits are in proportion to the local committees and code authorities. In some cases this benefit becomes a detriment. The codes have done a great deal of good in getting the different members of the industry together, but where members in any industry had been working together prior to the codes they have been a detriment, because they have opened the door to anyone to participate and in that way placed many undesirables in the same field and on the same basis as any other one in that field.

I hope that out of the chaos of codes there will be left a skeleton for local organizations with some freedom from the anti-trust law, this, with the hours-and-wage provisions, is all I think we should expect. I hope the bills that have a tendency to place "governmental snoopers" in our business will all be defeated. [*Sand and gravel*]

* * *

IN so far as it has tended to stabilize prices [the N.I.R.A.] has done our industry considerable good; and while doubtless the whole N.I.R.A. might be modified to advantage, we would favor its continuance in some form. One stipulation should, however, be made of whatever form the act may assume: its provisions should actually be enforced.

Under N.R.A. our pay-rolls have been increased, but efficient management has kept costs from soaring; and through local coöperation, inspired by the national sand-and-gravel code, producers in this locality have been able to obtain a fair price for their products, so that the business created by federal funds has at least brought a slight profit to the producer.

Our labor relations have always been pleasant, and continue to be so; employment has of course been increased to take care of improved business, and the average wage has increased considerably. Production and profit are rising above the red, principally because of federal money in large local projects. Relations with our competitors are friendly, members of the industry are necessarily more aware of their associates than they were previous to N.R.A. And coöperative enterprise has shown most of the producers to be gentlemen; a dozen N.I.R.A.'s would not make the remaining few anything but cheap "chiselers." Code violations of the latter are known, though not always technically provable and very rarely punished.

The larger view of industry possible through such a medium as N.I.R.A. should not be lost; we have had a glimpse of the entity of which each producer is but a subordinate member, and if we are ever to achieve our ideal of efficiently-organized industry we can not afford to discard the beginning we have made. [*Sand and gravel*]

* * *

WE are most emphatically of the opinion that N.R.A., in spite of its shortcomings which are many, has been of inestimable benefit to our companies and to the industries in which we are directly interested, namely, mineral aggregates, lime, cement, and builders' supplies. We favor the extension of the general principles of the law and see no need for modification. The difficulties encountered have been in adapting the law to business, rather than the law itself.

Most assuredly it has increased purchasing power and has been the basis for the recovery of our business and our industries. Without it, they would have sunk to greater depths than before. It has reduced unemployment markedly, and has checked wasteful competition.

There are so many factors involved in the restoration of national confidence that it is impossible to ascribe the part any particular move has played. We believe N.R.A. has undoubtedly helped to restore national confidence in the minds of a great many. It certainly could not restore national confidence in the minds of those who were thriving temporarily, by means of starvation wage rates and long hours and unfair competitive practices.

There have been a number of violations of the fair-practice provisions of the codes of each of our industries. However, these have been very small in percentage, and when analyzed, a large percentage of the violations can be shown to be of provisions impractically drafted, or provisions that . . . were not in themselves fair-practice provisions.

We believe the principle of a fair minimum wage and substantial restriction of maximum hours is essential to protect the purchasing power of this country. We do not believe that price-fixing in any form should be permitted by any code, but favor the provision advocated by N.R.A. against wilfully destructive price-cutting. We are opposed to production control of any kind in codes.

We advocate most earnestly the general adoption of a true open-price policy, wherein each manufacturer determines independently the price levels f.o.b. his plant, and is required to publish and sell at his chosen prices to all customers in a like class without discrimination. He should always retain the right to change his prices by proper notice to all concerned, and should have the right to meet unfavorable transportation-cost differentials within reasonable limits.

It appears that N.R.A. policies along these lines have become reasonably well standardized on sound ground, as witnessed by codes recently approved. There is one important policy that is under public attack and upon which N.R.A. has not yet taken a definite stand, namely, customer classification. The open-price policy becomes completely invalidated if customer classification is not permitted as an integral part of it. In some industries customer classification is desirable for discounts based on volume, but particularly in the building-supply industries is customer classification essential, based on methods of distribution. For example, the building-supply dealer is essential to the economic distribution of builders' supplies. A dealer, therefore, should be granted a trade discount from the manufacturer's consumers' price, in sufficient amount to cover his costs of retail distribution. By the same token, a jobber who distributes exclusively at wholesale to dealers should have an additional discount, in order to cover his costs of distribution to dealers. The open-price policy collapses, if customers may be shifted from one classification to another classification at will, solely for the benefit of making that customer a lower price.

Costs of administration of codes have been attacked, and very properly so in many cases. However, it is our experience that, where sound codes are being soundly administered, the costs of administration have been infinitesimally small, compared to the benefits resulting therefrom.

If asked to select the reason for the greatest single criticism of operation under N.R.A., I would say that it was the mistaken impression of code authorities and their subcommittees that they were law-making rather than administrative bodies. Codes are laws and should be drafted as such. They should grant power to code authorities to administer the law as written, but not to amplify it. If code provisions require interpretation because of ambiguities or provisions hasty drafting, unsound in practice, the law itself should be revised. I have yet to find a case in our industries where the small manufacturer has not benefited to a marked degree under code operation, excepting in some instances where code authorities, or subcommittees thereof, have tried to apply restrictions to the small manufacturer beyond the direct provisions of the code. [*Ready-mixed concrete and sand and gravel*]

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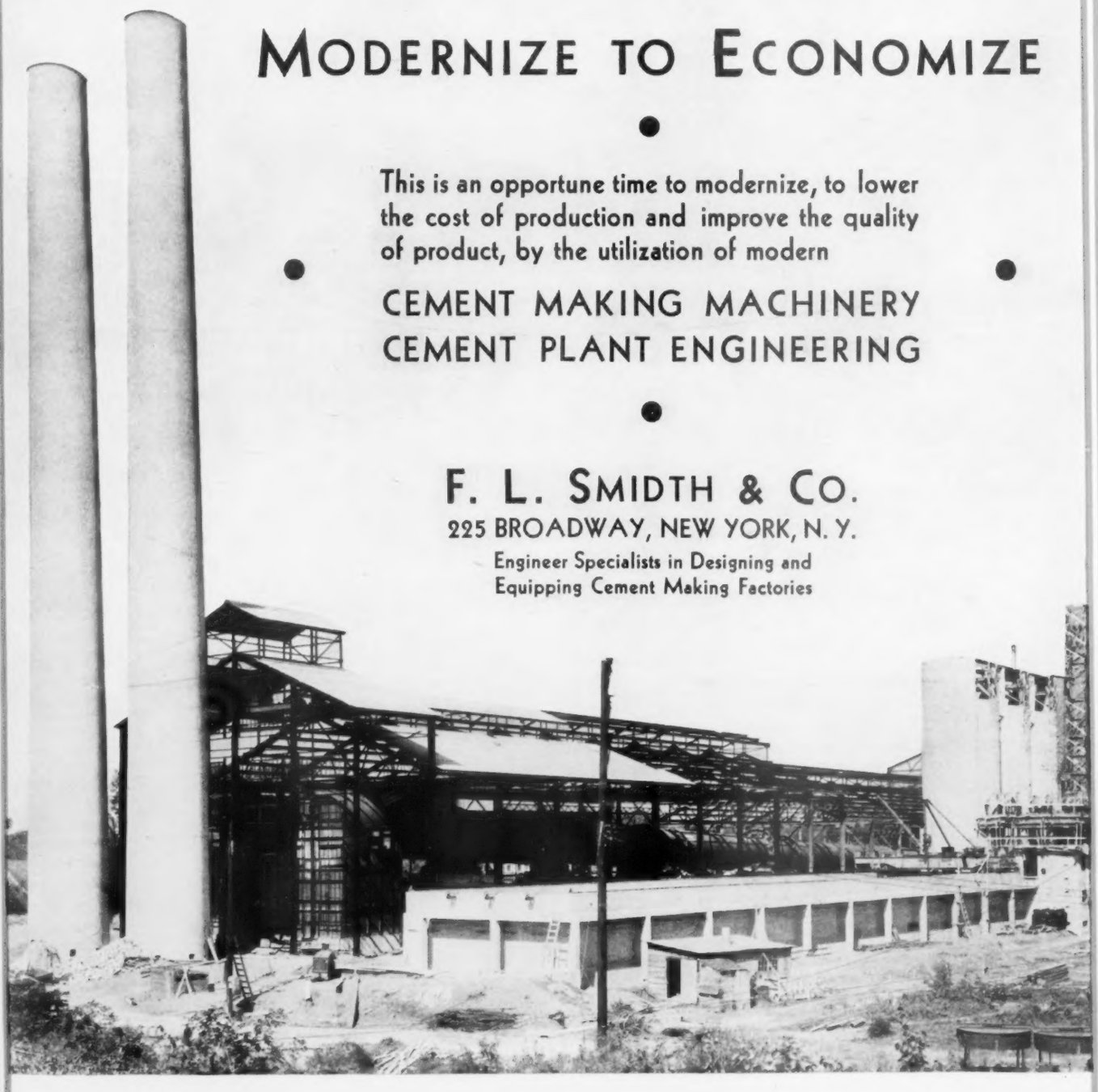

General view of the new National Portland Cement Plant at Brodhead, Pa., recently completed by the M. A. Long Company.

Showing view of the silos of the National Portland Cement Plant at Brodhead, Pa.

National Portland Cement Plant Added to "LONG" List!

The new National Portland Cement Plant at Brodhead, Pa., is another example of the long list of achievements of The M. A. Long Co. in designing and constructing modern plants to meet the specialized needs of American Industry.

Whether a building project is large or small, The M. A. Long Co. plans and schedules each operation and dovetails them nicely, so as to assure economical erection costs and efficiency when in use. For the last decade this organization has been setting standards of building and the maintenance of building schedules generally recognized as unparalleled in the annals of concrete construction.

In the erecting of the new National Portland Cement Plant, The M. A. Long Co. organization prepared all drawings of the Buildings and constructed the specially designed Stockhouse, Packhouse, Slurry Tanks, Slurry Basin, Kiln Building, and Wash Mill, and completed the building program on schedule.

Long engineers were always alert to cooperate with the management of the National Portland Cement Company to make this new plant the last word of efficiency in the cement industry.

Write us for full information regarding Long Building service which includes the design and construction of Cement Plants, Grain Elevators, Schools, Apartment Houses, Churches, Etc.

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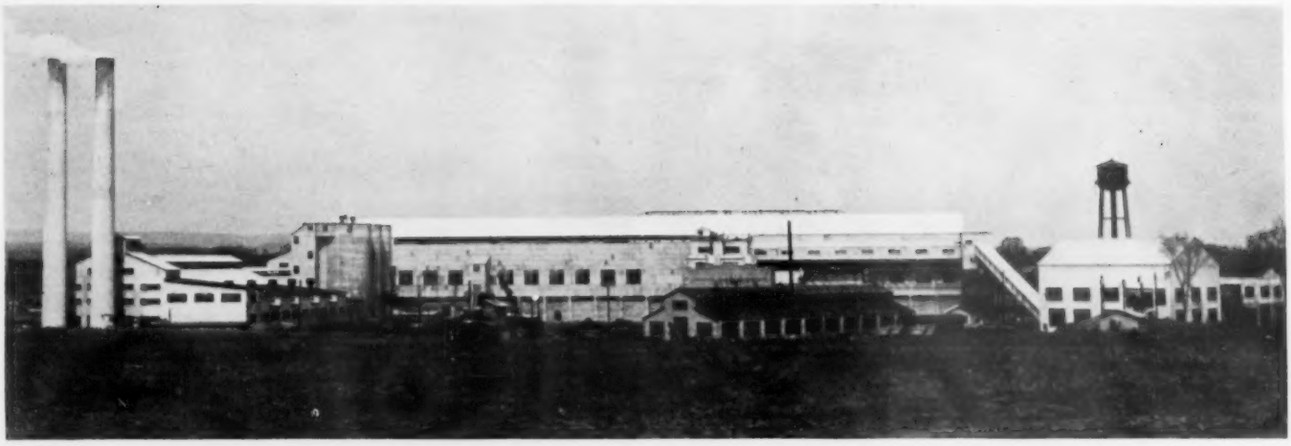


The new plant of the National Portland Cement Co. at Brodhead, Pa. From left to right are shown kiln stacks, kiln building, slurry-blending silos, main storage building, crusher building and clay-washer building. In foreground is the combined machine shop and storage building.

Industry's Output Capacity Increased by New 3600-Barrel Cement Plant

Efficiency is Attained Without Loss of Flexibility Through Sound Design

By W. E. TRAUFFER

THE first new cement plant built in the United States since 1929, that of the National Portland Cement Co. at Brodhead, Pa., was formally opened March 15, when one of its two large rotary kilns was put into operation. The plant now stands as the latest monument to the initiative and organizing ability of its vice-president and general manager, Fred B. Franks, Sr., who conceived this project and carried it through to successful completion in spite of the adverse conditions prevailing. Mr. Franks, together with the engineering department of his company and those of the companies furnishing important plant equipment, also deserves credit for the design and construction of a plant, which in efficiency and economy of operation is well in advance of the standards of the industry in general. Only the latest approved methods of operation and equipment are used. The plant has a capacity of 3,600 bbl. daily or about 1,250,000 bbl. annually.

Preliminary work on this project was begun early in 1933. This consisted mainly of testing the deposit, diverting a creek which had traversed the plant site, erecting the office and the combined machine shop and parts-storage buildings, etc. Active work on the construction of the plant was begun in March, 1934, and it was in operation a year later.

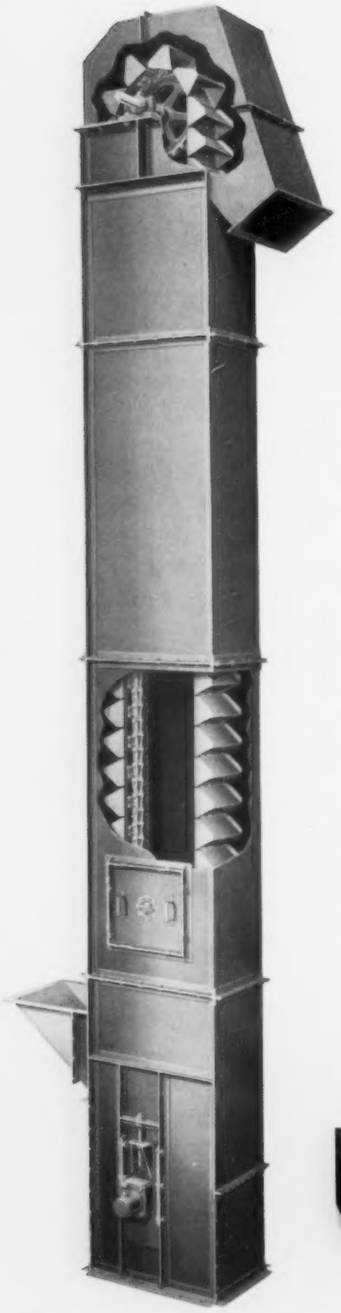
In the design of this plant special attention was

View in partly-developed quarry showing the two shovels, locomotive and cars. Pump-house is at left.

One of the two 2-cu.yd. electric shovels loading an 8-cu.yd. car hauled by gasoline locomotive.

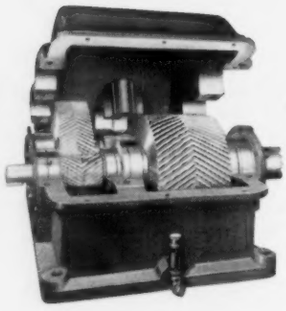
LINK-BELT

CONVEYORS, ELEVATORS, DRIVES at National Portland Cement Co.



The Link-Belt bucket elevator line is complete and includes practically every type of steel, malleable, and Promal chains, and buckets, as well as steel casings of all types.

Link-Belt makes a complete line of positive driving equipment including motorized helical gear, herringbone gear, and worm gear speed reducing units as well as silent and roller chain drives. Send for catalogs.



AT the new plant of the National Portland Cement Company, Broadhead, Pa., Link-Belt material handling equipment contributes to the efficiency of this modern plant.

Link-Belt bucket elevators, for handling clinker and gypsum and Link-Belt screw conveyors for handling cement, as well as Link-Belt speed reducers and other units, are used throughout this plant.

Link-Belt equipment is synonymous with dependable and economical performance. It is built to last, and work efficiently under the grueling conditions of cement manufacture. Send for Catalogs.

LINK-BELT PRODUCTS INCLUDE: *chains of all types (malleable, Promal, steel); sprocket wheels, gears, buckets, bearings, hangers, takeups, speed reducers, silent chain drives, roller chain drives, conveyors and elevators of all types, crawler and locomotive cranes, portable loaders, etc.*

LINK-BELT COMPANY

The Leading Manufacturer of Equipment for Handling Materials and Transmitting Power

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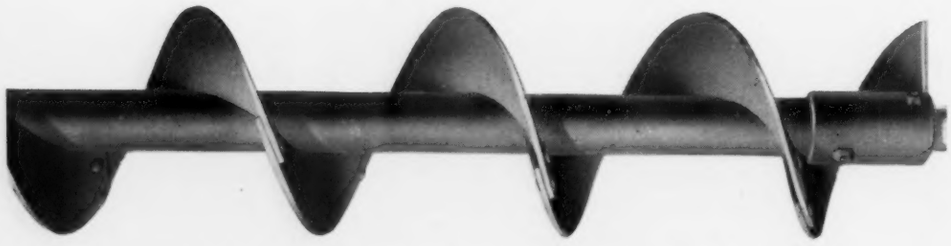

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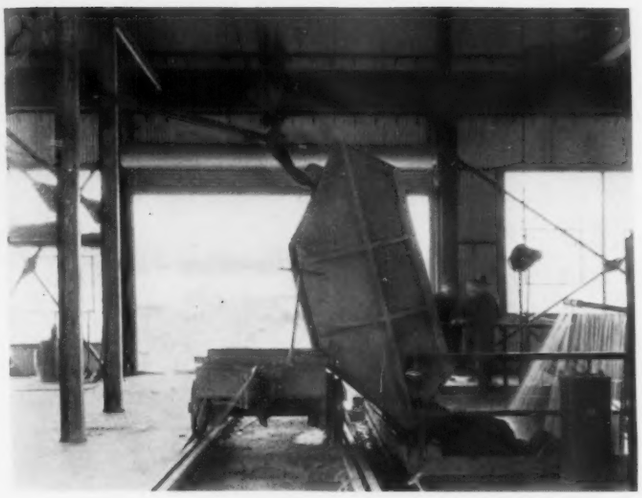


Car dumper tipping quarry car to discharge into primary-crusher feed hopper.

given to reducing the number of important equipment units. This was accomplished without sacrificing flexibility of operation and is evident from the fact that only eleven major units are required in the rock-crushing, raw-grinding, clinker-grinding, coal-grinding and kiln departments. The fact that the plant site covers an area of only 22 acres is also notable and the capacity of the plant can be doubled or trebled without exceeding these dimensions and without interfering with the operation of existing equipment. A feature of the design of the plant is the use wherever possible of alternative flows for the material to eliminate shut-downs due to failure of any equipment units. Accessibility of all parts of the plant and the equipment and safety of employees were other important considerations in the design of this plant.

The deposit from which raw materials for the plant are secured consists of 300 acres of high-calcium limestone and cement rock. Thorough tests of this deposit were made before the construction of the plant was started, and one report, by Joah Etchells, of Richard K. Meade & Co., Inc., Baltimore, Md., stated that, "Sufficient raw materials to manufacture 100,000,000 bbl. of high-early strength Portland cement underlie the property." Test holes 200 ft. deep were drilled over the entire property and a number of holes drilled to 1,000 ft. failed to run out of suitable rock. The two kinds of rock are in distinct formations, known as the Jacksonburg and Beekmanstown limestones, but are contiguous and can be successfully worked from a single quarry.

The Jacksonburg limestone ranges from low-lime to high-lime content. When it contains from 62 to 75 per cent. calcium carbonate it is locally known as cement rock. When it contains from 75 to 92 per cent. it is known as Jacksonburg cement limestone.

Another view of plant with cement-storage silos and pack-house in foreground. Clay and crusher buildings are in left background.

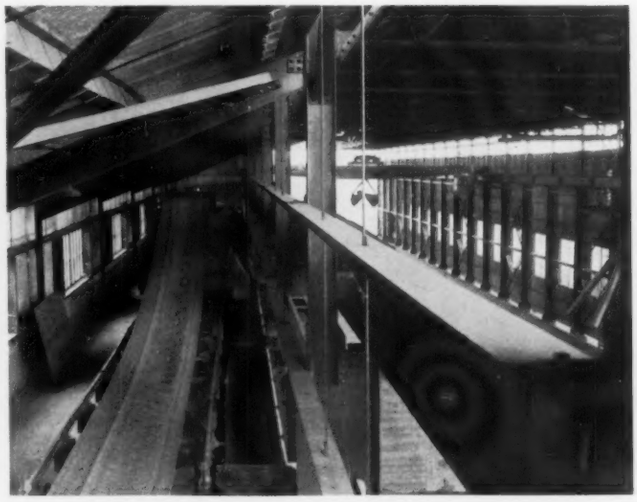
Although the quarry has been opened in the Jacksonburg limestone it is expected that the limestone of the Beekmanstown formation will be blended in as the quarry is developed.

The following are average analyses of the two types of stone:

	Jacksonburg Cement Rock	*Jacksonburg and Beekmanstown Cement Limestone*
SiO_2	14.68 per cent.	5.56 per cent.
R_2O_3	6.10 per cent.	1.85 per cent.
$CaCO_3$	75.76 per cent.	89.72 per cent.
$MgCO_3$	2.86 per cent.	2.25 per cent.

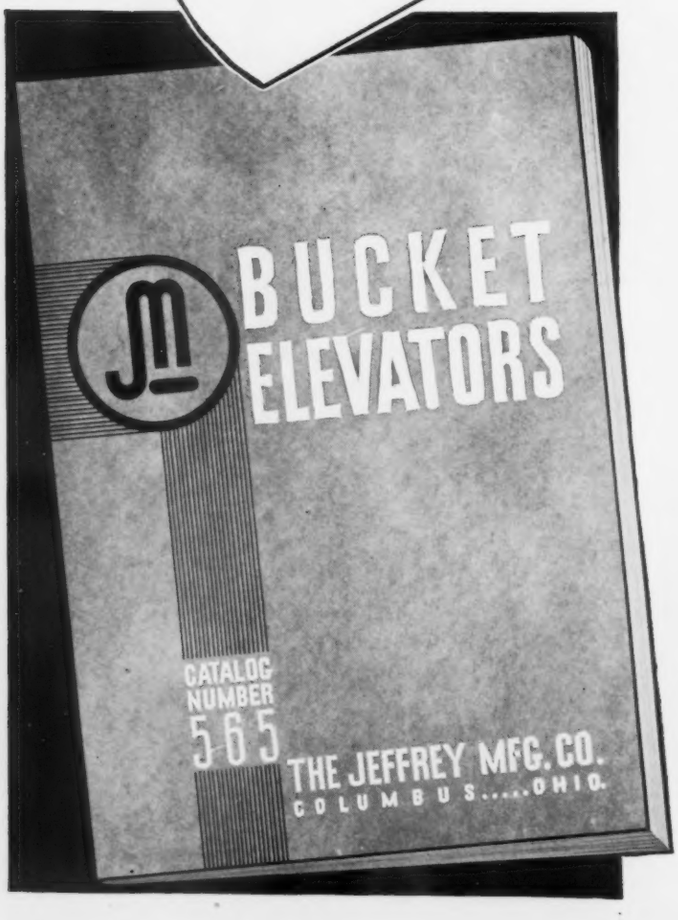
The cement made from these raw materials shows the following average analysis and strength:

Average Analysis		*Tensile Strength Normal Mill-Run Cement*	
SiO_2	21.48%	1 day	205 lb.
Al_2O_3	5.62%	2 days	265 lb.
Fe_2O_3	2.72%	3 days	328 lb.
CaO	63.82%	7 days	383 lb.
MgO	2.49%	28 days	495 lb.
SO_3	1.80%		
Loss	.90%		
Free CaO	.42%		



The horizontal conveyor and tripper which discharge stone to main storage building. Overhead crane in background.

The quarry was opened within 100 yards of the crusher building, insuring the shortest possible haul, while its location on a gently-sloping side hill will allow the ultimate development of an 80-ft. quarry face with a floor level only slightly below ground level. The quarry face is at present about 40 ft. high and 300 ft. wide and work is being carried on intensively to enlarge the quarry sufficiently to make possible efficient operation at capacity. The overburden consists of from 2 to 7 ft. of clay and this is being trucked to a near dump. Enough of this clay is being left on the rock to form a rough



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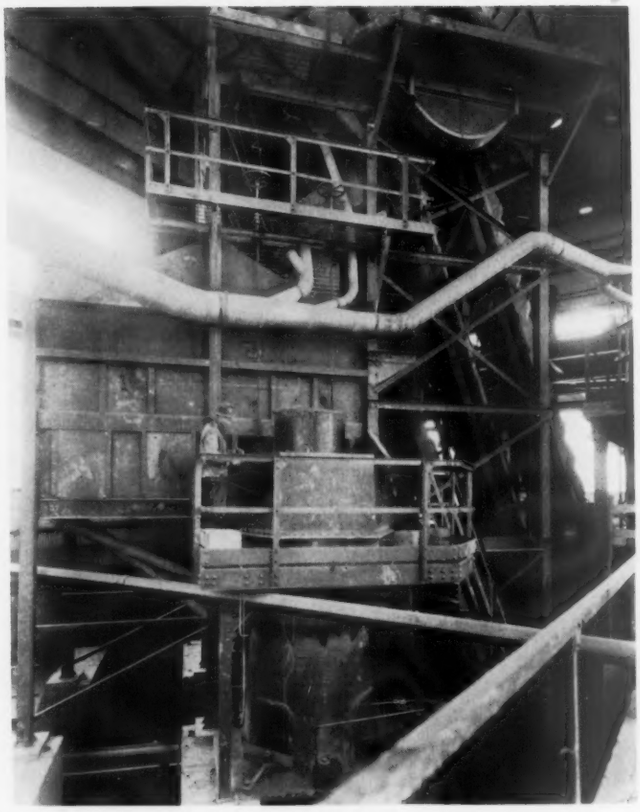
raw mix at the quarry. Later the clay will be loaded either from the waste dump or from the deposit, and hauled separately to the clay-processing building.

Blast holes are being drilled by contract with 6-in. Armstrong and Keystone well drills and they are at present being detonated in single-row shots of 8 holes each. Later staggered multiple-row shots will be made. Both the drilling and blasting are supervised by the cement company. Atlas 40-per cent. dynamite and electric blasting caps are being used. Secondary drilling of large rocks is being done with Ingersoll-Rand Jackhamers fitted with Timken renewable bits, and Atlas explosives are used. A two-stage Fuller rotary compressor rated at 250 cu.ft. per min. supplies air at 100 pounds pressure for the jackhammers.



The bucket-elevator from primary crusher which discharges to vibrating screen. One of two reduction crushers in foreground. Some of the pipe connections to the dust-collector are shown.

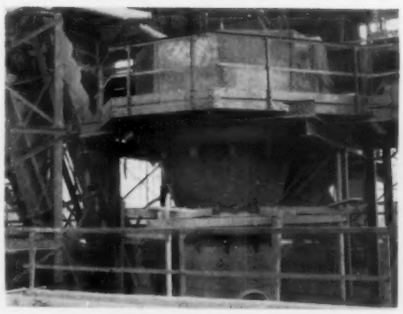
Loading is at present being done by a P&H Type 1200 electric shovel equipped with a 2-cu.yd. dipper and Ward-Leonard control. When the quarry has been enlarged sufficiently a second similar shovel, which is on hand, will be put in operation. These shovels have Westinghouse variable-voltage control equipment.

Stone is loaded into 8-cu.yd. Atlas standard-gage steel side-dump quarry cars. There are 12 of these cars on hand. Cramped conditions allow the use of only 5 at present, but additional cars will be put into operation as the quarry is developed. A Vulcan 12-ton gasoline locomotive hauls the cars to the foot of the incline leading to the crusher building, a present haul of less than 100 ft. Another locomotive is to be added later.

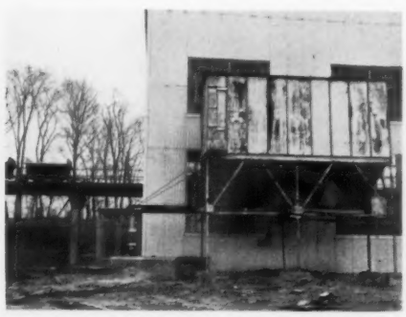
Loaded cars are hauled up the double-track incline one at a time by means of a double-drum Vulcan hoist. The method makes possible partial counterbalancing of the load by lowering an empty car at the same time as a full one is raised. Later, when clay is being handled separately, one track and hoist will handle the rock, and clay will be hauled through the crusher building on the other track to the clay-level. Near the top of the incline a double-track cross-over permits the ascending loaded cars to pass the descending empty cars without interference or switching. The incline has a slope of 12 deg. and the rise from the present quarry level to the discharge level is 33 ft. This lift is expected to be increased to about 50 ft., when the permanent quarry level is reached.

Cars of stone are dumped into a 20-ton steel hopper in the crusher building by means of an Easton automatic car dumper which is operated by a Lidgerwood single-drum hoist. A hook engages a special bracket on the side of the cars and a lever arrangement controls the movement of the hook in such a manner that the car body is under control at all times. This arrangement also returns the emptied body.

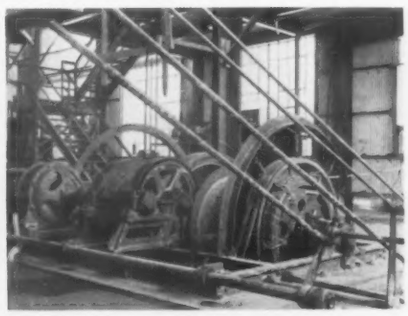
A Kennedy-Van Saun pan feeder, 48 in. wide and operating on 20-ft. centers, takes the stone from the hopper and discharges it into the Kennedy-Van Saun No. 36 gearless gyratory primary crusher. Because of the fact that the stone at times contains considerable clay a water spray has been installed over the hopper to prevent plugging. The excess water is carried off through a flume. A 20-ton Chisholm-Moore overhead crane serves this building. The primary crusher reduces the stone to 8-in. size and under and discharges it to a Kennedy-Van Saun



The No. 36 gearless gyratory primary crusher with elevator at left.

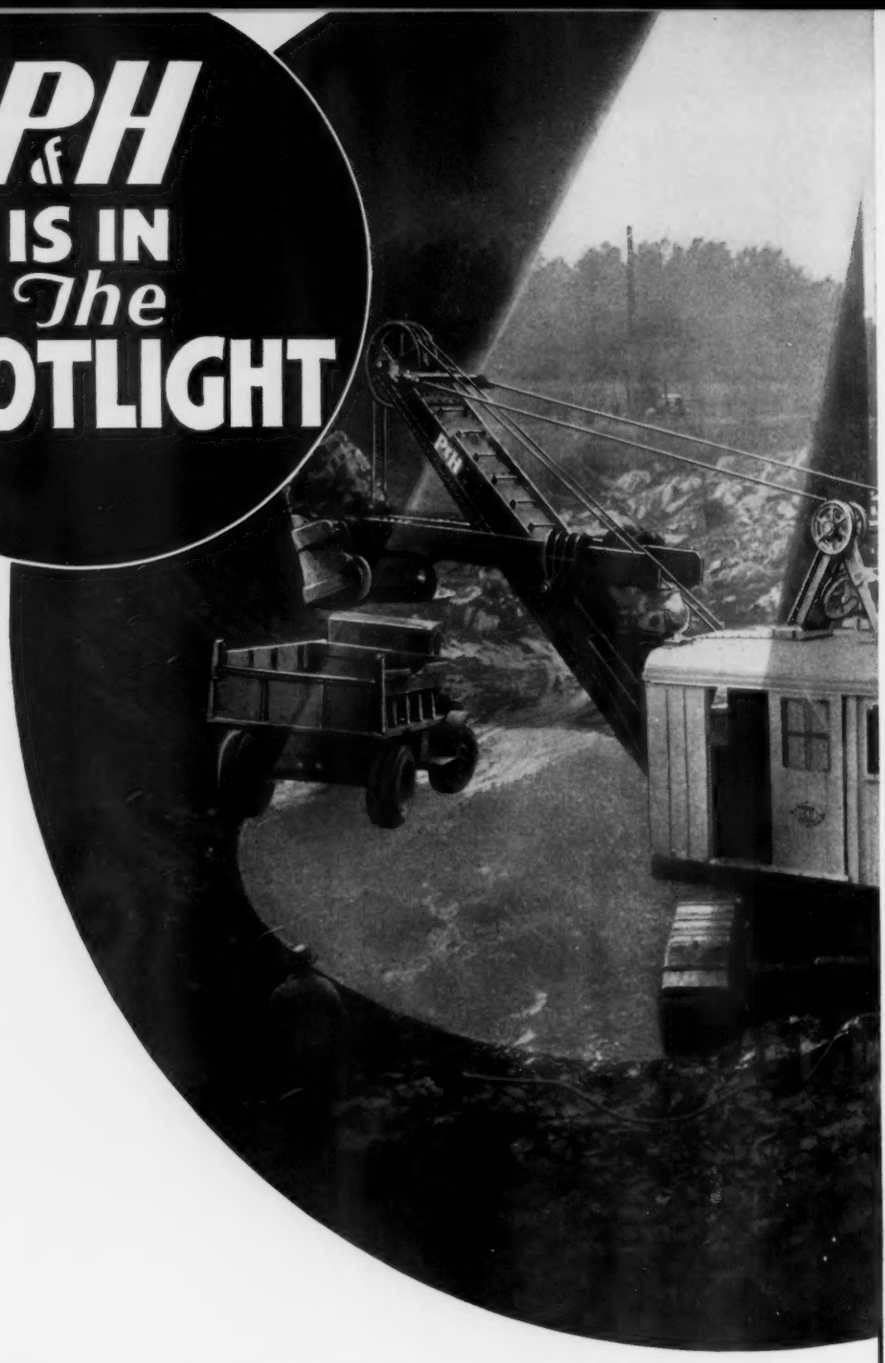


The dust-collector connected to primary and secondary crushers and elevator.



The 2-drum hoist operating the balanced skip. Controlled by levers from floor above.

P&H IS IN The SPOTLIGHT



AS AMERICA'S MODERN CEMENT MILL Gets Under Way

There's the last word in cement-making methods at the new plant of the National Portland Cement Company at Brodhead, Pennsylvania. And with this P&H 1200 WL, there's the last word in equipment, too. . . . Even before buildings were completed, this machine was on the job . . . toting steel beams . . . lifting 37-ton parts for crusher assembly . . . grading for ramps . . . gearing up for quarry operations in general. . . . That sample of P&H performance was enough. Fast, continuous production is the demand on excavators to keep pace with America's most modern cement plant. That's why a second P&H 1200 WL went to Brodhead.

Equipment Selected for High Production

Representing an investment of $2,500,000, the facilities of the new plant of the National Portland Cement Company at Brodhead, Pa., provide capacity of one and a quarter million barrels per year. All equipment has been selected to meet the demands of sustained high production.

Faster Operating Speeds For Excavators

To maintain a continuous supply of rock for the crushers, P&H Ward Leonard machines were selected. Faster operating speed is accomplished through high over all horsepower and a more advantageous distribution of weight. The carefully grouped machinery units behind the center of rotation act as a natural counterweight and do away with much of the dead-weight which would otherwise be required. It means a consequent increase in operating speeds with maximum power efficiency.

Swing Increased to 3½ R. P. M.

The P&H swing units, built on the modern vertical motor, helical gear principle, speed the swing up as fast as 3½ R.P.M. On the 4 yard swing units operate in parallel, each sharing one-half of the torque required to rotate the machine. All gears and shafts are mounted on antifriction bearings and sprayed with oil from a separate, high pressure pump.

Simplified Control by Push Buttons

In the interest of faster, simpler operation, all movements of the P&H Ward Leonards are electrically controlled, eliminating hand levers and manually operated foot pedals. This applies to steering as well, which is accomplished through the use of electrically operated hydraulic cylinders. Travel speeds up to 1½ M.P.H. are unusually high for machines of 2, 3 and 4 yards capacity. Ask for catalog WL-1.

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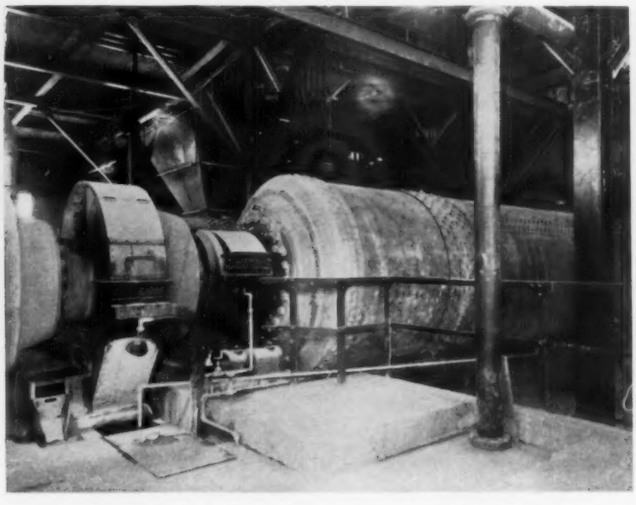
P&H WARD LEONARD ELECTRIC EXCAVATORS

continuous chain-roller bucket-elevator which is 36 in. wide and operates on 55-ft. centers. This elevator discharges the stone over a Kennedy-Van Saun vibrating screen into a 50-ton steel surge-bin divided into two compartments. The material retained on the screen is chuted to one compartment, which supplies the two Kennedy-Van Saun No. 49 gyratory crushers. The material passing through this screen goes to the second bin compartment, the material from which, together with the product of the crushers—all 1-in. and under—is discharged on the main belt-conveyor. The crusher building has a total of 300 hp. installed and has a capacity of 300 tons per hr. When the quarry is fully developed it is expected that all the plant requirements can be supplied in a 6-hr. day.

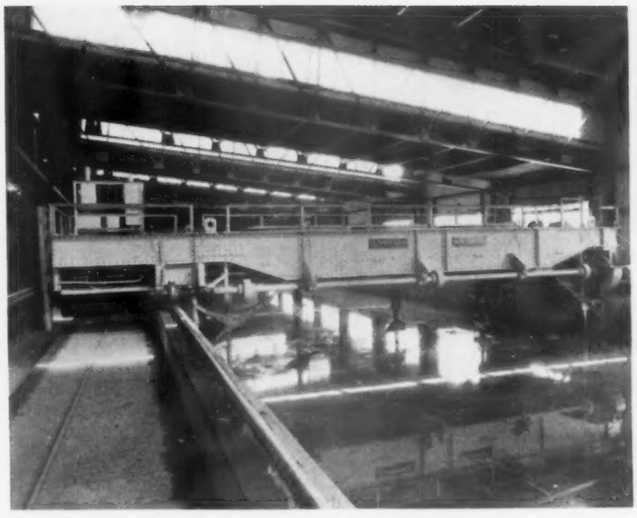
The main Jeffrey belt-conveyor is 36 in. wide, is placed on 300-ft. centers and carries the stone through an inclosed inclined gallery to a junction house at the corner of the main storage building. There the stone is discharged on a Jeffrey 36-in. horizontal distributing belt-conveyor which operates on 180-ft. centers and parallels the side of the storage building. A traveling tripper of the same make allows the stone to be discharged into storage at any point along the length of the belt. When desired, the stone can be discharged from the end of this belt into the raw-mill feed-bins.



One of the two four-compartment, raw-grinding tube-mills.

As previously stated, cars of clay will be hauled up the same incline as the stone and by the same Vulcan hoist, but they will be drawn through the crusher building to the dumping floor of the clay-processing building alongside. The cars will be dumped by an Easton automatic car dumper identical with the one in the crusher building and also operated by a Lidgerwood hoist.

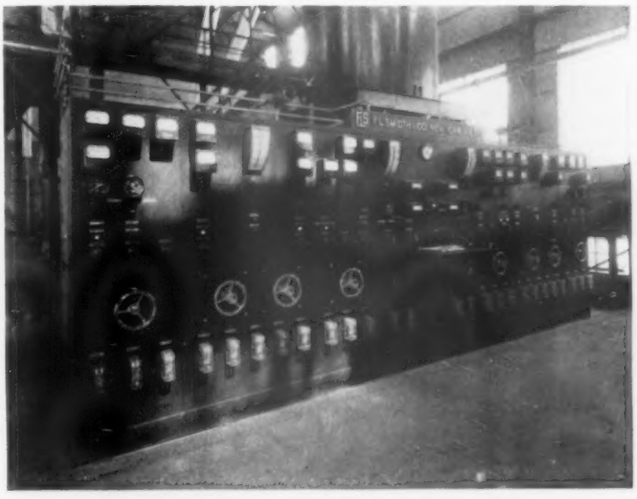
The clay is discharged from the cars into an F. L. Smidth 24-ft.-diameter wash mill, which is equipped with a mechanical agitator. Any rock in the clay settles to the bottom and is drawn off periodically, through trap doors in the bottom of the concrete mill tank, into trucks below. The clay is decanted off with a 60-per cent. water content through two spouts to the concrete clay-storage basin. This is



The three-paddle traveling agitator which prevents settling of slurry in main storage-basin.

52 ft. long, 20 ft. wide and 20 ft. deep and is equipped with four Smidth mechanical agitators. A small amount of compressed air is also used to prevent stratification of the washed clay. A 3-in. Wilfley slurry pump sends the clay slip from this basin to a Smidth dual-scoop feeder, which is equipped with counters and supplies the raw-grinding mills. Any excess overflows the feeder hopper into the storage basin.

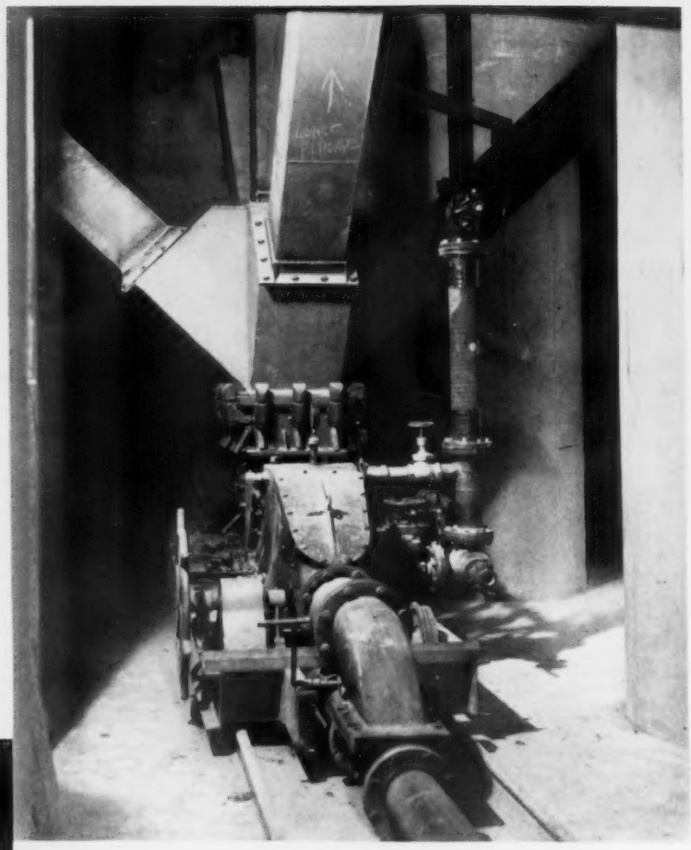
The raw-material and clinker storage-building is 550 ft. long and 80 ft. wide, and is divided into sections for the separate storage of high- and low-lime stone, clinker, coal and gypsum. The building's storage capacity for these different materials is as follows: Stone 200,000 bbl., clinker 200,000 bbl., coal 15,000 tons, gypsum 1,800 tons. A P&H 10-ton overhead crane, equipped with a 3 cu.-yd. Blaw-Knox clam-shell bucket, distributes these materials in storage and rehandles them to the raw- and finish- and coal-grinding mill-feed bins, all of which abut upon the storage. The four raw-mill feed-bins are of concrete and have a capacity of 400 tons each. Each of the two raw-grinding mills has one bin for high- and one for low-lime stone. Individual



The control board in front of kilns which controls and records all factors entering into burning of cement.

THREE TYPE H PORTABLE

FULLER-KINYON CEMENT PUMPS

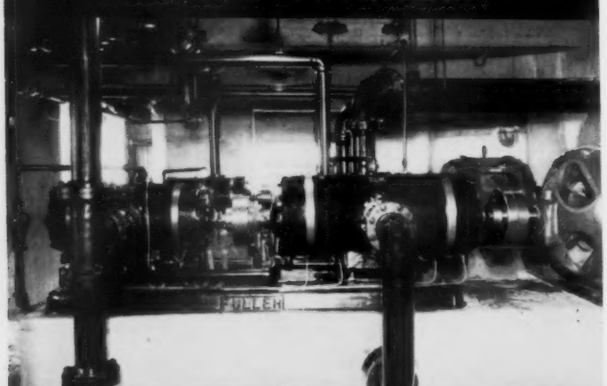


THREE SINGLE-STAGE AND THREE TWO-STAGE

FULLER-ROTARY COMPRESSORS

ONE OF PORTABLE PUMPS BELOW THE SILOS

ONE OF THE SINGLE-STAGE COMPRESSORS



TWO OF THE TWO-STAGE ROTARY COMPRESSORS

AT THE NEW PLANT OF

NATIONAL

PORTLAND CEMENT CO.

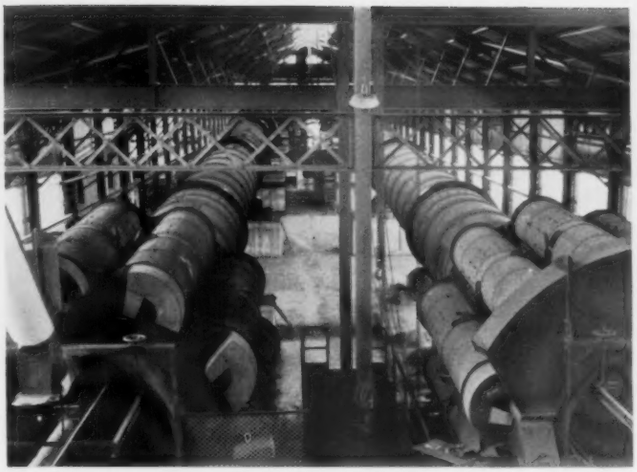
cement is withdrawn from silos and conveyed to the packhouse by three Portable Fuller-Kinyon Pumps, travelling on parallel tracks below the bin spouts. This installation brings the number of the new Portable "H" Pumps in actual service up to fourteen. Like the stationary type, these new low pressure, low velocity pumps are showing remarkable power economy.

All of the compressed air for the plant is furnished by Fuller Rotary Compressors. Three single stage machines, one of which is shown at the left, serve the three pumps independently and also furnish air for the packhouse including the packer spill conveyors. Each has an actual free air delivery of 530 CFM at 720 RPM when compressing to 40 pounds gauge. The two-stage machines, shown at the bottom of the page, furnish air for conveying cement from mills to silos and for agitating slurry. Each has an actual free air delivery of 800 CFM at 720 RPM when compressing to 75 pounds gauge. A small two-stage unit serves the quarry with 232 CFM compressed to 100 pounds gauge.

Fuller Company

CATASAUQUA, PENNA. U. S. A.

Chicago: 1118 Marquette Bldg.
Paris: E. Constantin. 105, Rue Lafayette
Hamburg: Claudius Peters, Walhoff, Glockengiesserwall 2



The two 372-ft. rotary kilns with their attached cylindrical coolers. Note guards covering moving parts.

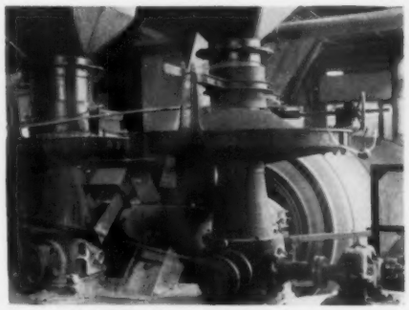
Mill-motor room with motors and gear reducers. Motor-generator set with auxiliary gasoline engine in background.

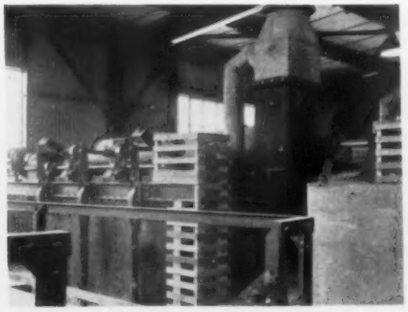
Smidth table feeders under these bins proportion the stone to the mills in the desired quantities.

The mill building houses four F. L. Smidth 8-ft. by 36-ft. 4-compartment Unidan mills, two for raw and two for finish grinding. These are identical in every respect, except that the raw mills have smaller motors. Each mill is loaded with 60 tons of grinding media, balls being used in the two first compartments and Cylpebs in the last two. All four mills are driven through Smidth Symetro geared speed reducers, the raw mills by 800-hp. and the finish mills by 900-hp. Westinghouse motors. The slurry from the raw mills has a moisture content of about 35 per cent. and is discharged into a concrete pump-sump. Two 6-in. Wilfley centrifugal slurry pumps, one of which is a spare, force the slurry into one compartment of a distributing box which has six outlets discharging into the six concrete slurry-blending silos. These silos are 22 ft. in diameter and 40 ft. high and have a capacity of 1,400 bbl. each. The slurry is agitated by compressed air entering the conical bottoms of the silos.

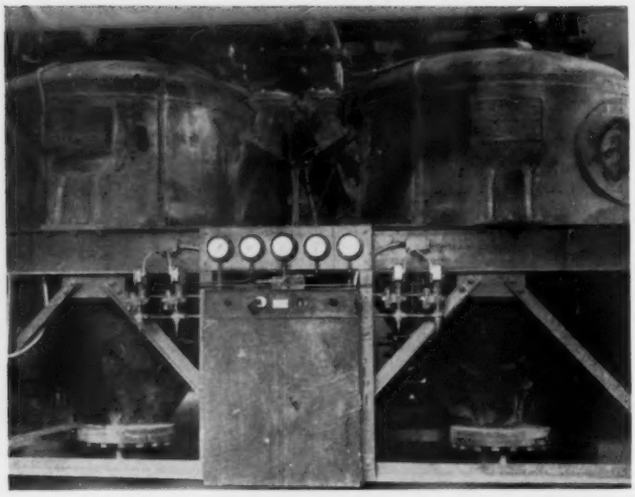
The materials from a number of silos may if required be blended by drawing slurry from them to a concrete pump-sump. A 6-in. Wilfley pump draws from the sump and feeds the slurry to the other compartment of the distributing box over the silos. This also has six outlets which allow discharge of the slurry to the silo whose contents are being blended. After the contents of a silo have been blended the slurry is drawn off by gravity to the main rectangular concrete slurry-storage basin, which is housed alongside the kiln building. This basin is 200 ft. long, 35 ft. wide and 21 ft. deep and has a capacity of 16,000 bbl. of slurry, sufficient for four days' operation of the plant. The slurry in this tank is agitated by an F. L. Smidth traveling mechanical and compressed-air agitator, having three paddles, which spans the basin and travels its length. Slurry is fed from this storage basin to three 3-in. Wilfley slurry pumps—one of these is kept in reserve—which deliver it to single feeder trough over the two kilns. Two Smidth scoop feeders measure the slurry as it goes to the kilns. An excess of slurry is always pumped to the feeder trough to insure an adequate supply and the overflow goes back to the storage-basin by gravity. These feeders are operated by F. L. Smidth patented variable-speed motors operating in synchronism with the kiln-motors. When desired, the slurry can be fed direct from the blending silos to the kiln feeder, by-passing the main storage-tank; the two 6-in. Wilfley pumps provided to recirculate slurry to the silos being usable for this purpose. This arrangement allows switching from one type of cement to another without the delay necessary to empty the large tank.

The two F. L. Smidth kilns are of the latest type and are equipped with a complete system of control. They are 372 ft. long and are divided into three cylindrical sections of approximately equal length, the end sections being 10 ft. and the





Left: Gypsum and clinker table feeders to one of finish-grinding mills. Note drive of both from one motor. *Above:* Dust-collector connected to one of finish mills. *Right:* One of the separators operating in closed-circuit with finish mills. Fan and cyclone also shown.



Pneumatic pumping system which conveys finished cement from mills to cement-storage silos.

center section 9 ft. in diameter. These sections are connected by 6-ft. tapered sections. The kiln shells have a pitch of ½ in. per foot.

Each kiln has 6 tires, mounted on single oil-lubricated bearing rollers, and has thrust rollers on the fourth tire. Smidth counterweighted air seals at the stack ends of the kilns prevent the loss of draft at those points. The geared drive ring is connected to the kiln shell near its center by spring plates and is driven through a train of gears and a Smidth speed-reducer by a 100-hp. Westinghouse variable-speed d.-c. motor having a speed range of from 400 to 1,200 r.p.m. On each kiln-motor drive-shaft is an F. L. Smidth sending unit for slurry-feed control which generates current to operate the slurry-feed motors, thus maintaining a constant relation between the kiln speed and the rate of slurry feed. Any change in the slurry feed rate is made at the feeder. A Westinghouse solenoid brake and a Veeder-Root revolution counter are also connected to the kiln motor, the former to prevent the kiln from rocking when the power is cut off.

The first 80 ft. of the burning zone is lined with Harbison-Walker 70-per cent. high-alumina brick and the remainder of the kiln is lined with 40-per cent. brick of the same make. The feed end of the kiln is fitted with a 68-ft. Smidth regenerative chain system to facilitate heating of the slurry and the absorption of slurry moisture by the hot kiln gases, to reduce the exit temperature of these gases, and to lower the dust loss. Each kiln has a Smidth steel-plate draft fan, and a Smidth automatic motor-operated *louvre* damper located between the rear housing and the fan intake. Both these units are regulated from the kiln-control board.

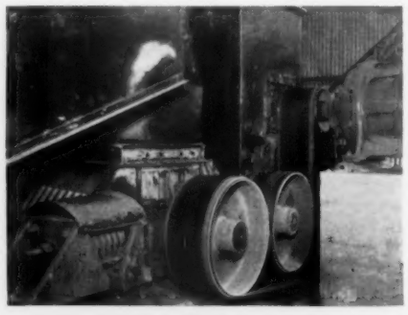
The kiln gases are discharged at a temperature of about 425 deg. F. through dust chambers into the two kiln stacks, which were located off the kiln center-lines to allow by-passing of the fans for natural draft if necessary. Hoppers and chutes under the dust chambers allow the removal of collected dust. The reinforced-concrete kiln stacks were erected by the Alphonse Custodis Chimney Co. and are 175 ft. in height with an interior diameter at the top of 8 ft. They have independent self-supporting brick linings throughout their entire height.

The F. L. Smidth master kiln-control board is located on the burner's platform directly in front of the kilns and gives the burner absolute control over all the factors entering into the burning of the cement. Instruments, indicators, recorders, switches, lights, etc., show the draft at both ends of each kiln, the temperature at the feed end, the temperature of the air (used for drying coal) leaving the discharge end, the temperature of the air entering the coal driers and leaving the coal mills, the kiln and coal-feeder speeds, the slurry-feeder operation, the fan and coal-mill motors, and the power input to the kilns and their accessory equipment. There are CO_2 and CO plus H_2 indicators, *louvre* damper controls and indicators, an interplant telephone, etc.

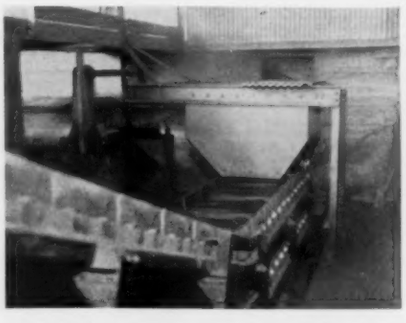
The fuel rate of the operating kiln is very low and indications are that the expected rate of 70 lb. of coal per bbl. of cement will be attained after a few more weeks of operation have given time to tune up the plant to its highest efficiency.

The Smidth kilns are equipped with Smidth Unax coolers consisting of ten cylindrical coolers equipped with chain to agitate the clinker and assist in dissipating their heat. These are placed in a single circular row paralleling the periphery of the kiln. The efficiency of these coolers is evident from the fact that the clinker leaves the kiln at a temperature of about 2,800 deg. F. and comes from the coolers at a temperature of about 300 deg. F.

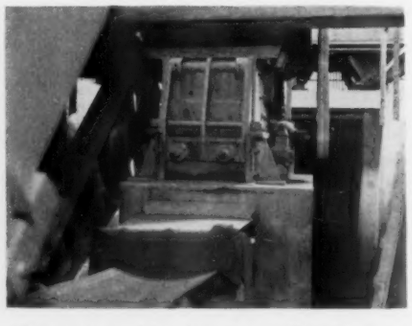
The cooled clinker is discharged from both coolers to a Smidth Skipulter conveyor, which is 60 ft. long and operates at right-angles to the kiln. A second Skipulter set at right angles to the first, discharges the clinker, which is



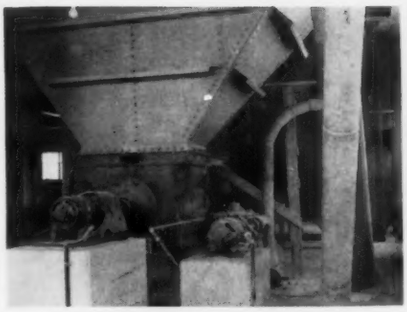
Pan conveyor feeding to and elevator taking from double-roll clinker crusher.



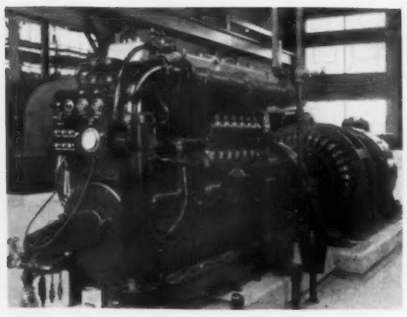
Reciprocating conveyor discharging clinker to pan conveyor.



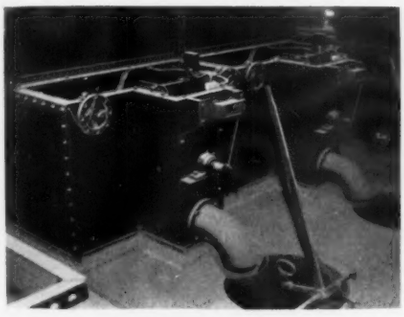
The coal-crushing hammer-mill with conveyor below; track hopper in background.



One of the two air-agitated feeders which discharge cement from bin to packer.



The six-cylinder, 400-hp. gasoline engine for auxiliary operation of kiln generators.



The dual-scoop feeder which supplies clay to raw-grinding mills.

now thoroughly cooled, on a 30-in. Jeffrey inclined apron conveyor which is placed on 60-ft. centers.

A Kennedy-Van Saun double-roll crusher reduces the clinker to a uniform size and discharges it into the buckets of a 16-in. Link-Belt steel-inclosed elevator which operates on 35-ft. centers and discharges the material into the clinker section of the main storage-building.

Gypsum is received in box-cars from which it is placed in a hopper feeding a 16-in. Link-Belt steel-inclosed bucket-elevator set on 40-ft. centers. This supplies the gypsum compartment of the main storage-building.

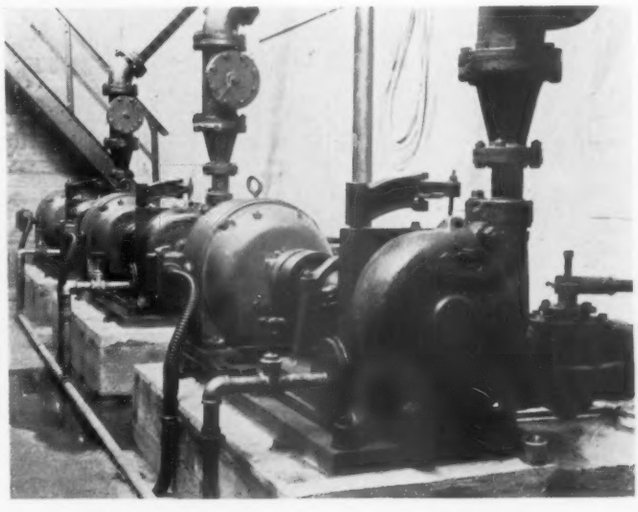
The bituminous coal used for firing the kilns is received in hopper-type railroad cars which discharge into a track hopper. A Jeffrey 24-in. inclined apron conveyor on 25-ft. centers feeds the coal to a Jeffrey 75-ton per hr. "Flex-Tooth" hammer-mill-type crusher. The material discharged from the crusher drops on a 24-in. Jeffrey inclined belt-conveyor which operates on 108-ft. centers and discharges the crushed coal into a 16-in. Link-Belt steel-inclosed bucket-elevator set on 55-ft. centers. This elevator discharges the coal either to the coal section of the main storage-building or direct to the coal-mill feed-bins.

Coal can be returned from storage to the mill-feed bins by the overhead crane or through openings in the floor of the coal-storage section which feed through gates and spouts to the belt-conveyor and elevator described above. The two reinforced-concrete coal-mill feed-bins have capacities of 100 tons each. Gates and chutes pass the coal to reciprocating and screw feeders on the two F. L. Smidth Tirax combination drying and grinding mills.

Each mill consists of a rotary drier and a two-compartment tube-mill operating on the same axis, driven by the same motor and drive, and connected by a hollow trunnion through which the dried coal is fed to the tube-mill section. Each mill has a rated capacity of 5 tons per hr. The drier section of each mill is 4 ft. 9 in. in diameter and 8 ft. long, the pulverizing section being of the same diameter and 16 ft. long. The hot air used in drying the coal is drawn from the kiln hoods at a temperature of about 500 deg. F. and leaves the mills at about 120 deg. F. It is drawn into the mills by two Smidth fans, which also draw the pulverized coal from the mills to two cyclones. The coal is discharged from the cyclones into two steel bins below, each of which is of 20 tons capacity and from each of which the coal is fed by double-screw feeders to the kilns. The air from the cyclones is vented to the fans described above and is part of the primary air supplied to the kilns. These feed bins have high- and low-level indicators which keep the operator informed of the amount of pulverized coal available.

Clinker and gypsum are rehandled by the overhead crane from their respective compartments in the main storage-building to the three concrete finish-mill feed-bins which have a capacity of 400 tons each. The center bin is used for gypsum, has two compartments and supplies both mills; each of the outer bins supplies clinker to one of the mills. Four Smidth table feeders supply the desired quantities of clinker and gypsum to each mill. The mills are Smidth 8-ft. by 36-ft. four-compartment Unidan mills, identical with the raw mills except that they are driven by 900-hp. motors.

The mills discharge into individual Link-Belt 18-in. screw-conveyors which are 46 ft. 9 in. long and empty into two Link-Belt 18-in. bucket-elevators operating on 70-ft. centers. When making ordinary cement, the elevators discharge their contents by gravity into a 200-bbl. steel storage-bin. When desired, the bucket-elevators can discharge into two Smidth mechanical and air separators operating in closed circuit with the grinding mills. Each sepa-



The three 3-in. centrifugal pumps which convey slurry from storage-basin to kiln feeders.

TABULAR ANALYSIS OF THE OPERATIONS AND EQUIPMENT OF THE NATIONAL PORTLAND CEMENT CO., BRODHEAD, PA.—Part I.
(Key numbers refer to corresponding numbers on accompanying flow-sheet.)

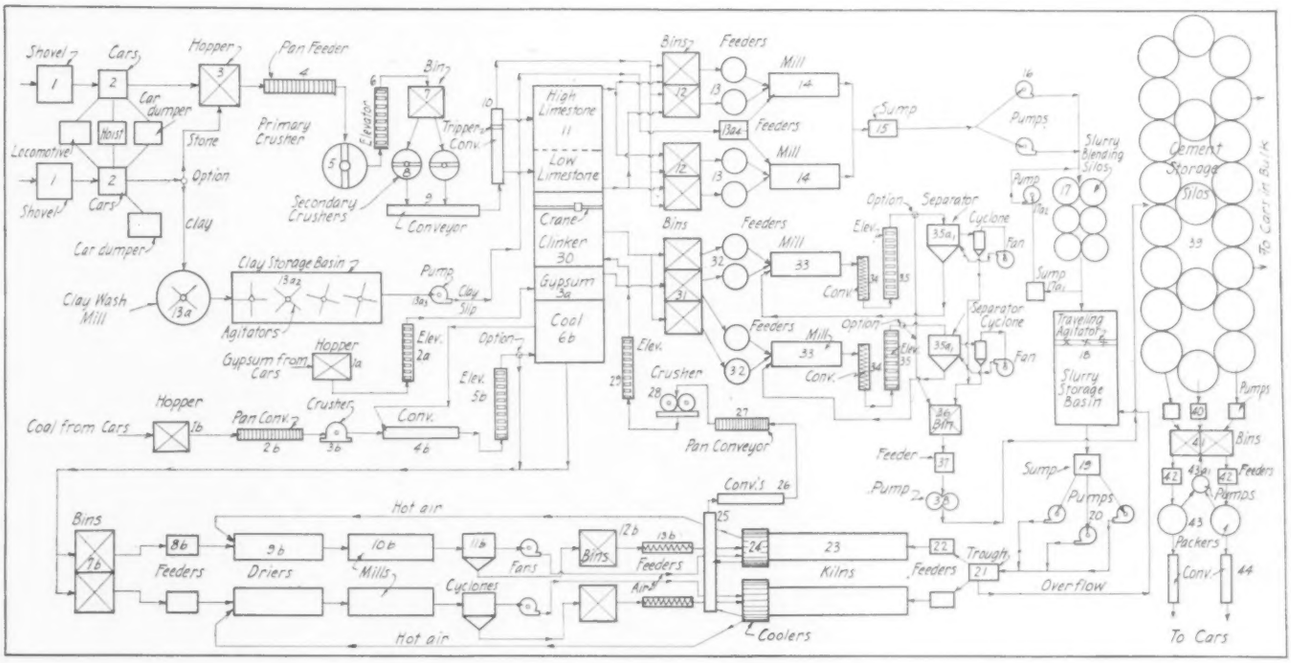
Operation	Key	Equipment	Make	Model No., Size, Capacity or Type	Power Source	Power Transmission
Limestone and clay quarrying	1	Shovels (2)	P&H	Type 1200, 2-cu. yd. Ward-Leonard control		
		Locomotive	Vulcan	12-ton gasoline		
	2	Cars (12) (Stone to 3, clay to $13a_1$)	Atlas	8-cu. yd., side-dump, steel		
		Hoist	Vulcan	2-drum, balanced-type skip	100-hp. Westinghouse motor	Gear
Limestone crushing		Car dumper	Easton	Automatic		
		Hoist	Lidgerwood	Single-drum	20-hp. Westinghouse motor	Gear
	3	Hopper		20-ton, steel		
	4	Feeder	Kennedy-Van Saun	48-in., by 20-ft., pan-type	25-hp. Westinghouse motor	Philadelphia gear reducer
	5	Crusher	Kennedy-Van Saun	No. 36 gyratory	150-hp. Kennedy-Van Saun	Direct-connected
	6	Elevator	Kennedy-Van Saun	36-in. by 55-ft., chain-bucket	40-hp. Westinghouse motor	Philadelphia gear reducer
	7	Bin		50-ton steel surge		
	8	Crushers (2)	Kennedy-Van Saun	No. 49 gyratory	75-hp. Kennedy-Van Saun motors (2)	Direct-connected
	9	Conveyor	Jeffrey	Belt, 36-in., 300-ft. centers	50-hp. Westinghouse motor	James gear reducer
	10	Conveyor	Jeffrey	Belt, 36-in., 180-ft. centers	15-hp. Westinghouse motor	James gear reducer
		Tripper (To 11 or 12)	Jeffrey	Movable		
Limestone storage and feeding		(From 10 or 11)				
	12	Bins (4)		400-ton, concrete		
	13	Feeders (4) (To 14)	F. L. Smidth	Table-type	$7\frac{1}{2}$-hp. Westinghouse variable-speed motor	F. L. Smidth gear reducers
Clay washing and feeding		Car dumper	Easton			
		Hoist (From 2)	Lidgerwood	Single-drum	20-hp. Westinghouse motor	Gear
	$13a_1$	Wash-mill		24-ft. concrete		
		Agitator	F. L. Smidth	Mechanical	50-hp. Westinghouse motor	F. L. Smidth gear reducer
	$13a_2$	Storage-basin		20-ft. by 60-ft., 1200-ton, concrete		
		Agitators (4)	F. L. Smidth	Mechanical	20-hp. Westinghouse motor	F. L. Smidth gear reducer
	$13a_3$	Pump	Wifley	3-in. centrifugal	25-hp. Westinghouse motor	Direct-connected
	$13a_4$	Feeders (2) (To 14)	F. L. Smidth	Scoop-type	.5-1-hp. Westinghouse motors (2)	F. L. Smidth gear reducer
Raw grinding	14	Mills (2)	F. L. Smidth	Unidan 4-compartment, 8-ft. by 36-ft.	800-hp. Westinghouse motors (2)	F. L. Smidth Symetro gear reducers
	15	Sump		Concrete		
	16	Pumps (2) (From 16 or $17a_2$)	Wilfley	6-in. centrifugal	100-hp. Westinghouse motor	Direct-connected
	17	Silos (6) (To $17a_1$ for blending or to 18)		Concrete, 22-ft. dia., 40-ft. high, 1400 bbl. each		
Slurry blending	$17a_1$	Sump				
	$17a_2$	Pump (To 17)	Wilfley	6-in. centrifugal	100-hp. Westinghouse motor	Direct-connected
Slurry mixing, storage and feeding		(From 17 and 21)				
	18	Basin		Concrete, 16,000 bbl., 220-ft. by 35-ft. by 21-ft. (deep)		
		Agitator	F. L. Smidth	Traveling, 3-paddle, mechanical and air	Travel, $7\frac{1}{2}$-hp. West. motor Agitators, 10-hp. West. motor	F. L. Smidth gear reducer F. L. Smidth gear reducer
	19	Sump		Concrete		
	20	Pumps (3)	Wilfley	3-in. centrifugal	40-hp. West'gh'se motors (3)	Direct-connected
	21	Trough (Overflow to 18)		Feeder, steel		
	22	Feeders (2)	F. L. Smidth	Scoop-type		Gear reducer
Burning and clinker cooling	23	Kilns (2)	F. L. Smidth	10-ft. by 9-ft. by 372-ft., 6-tire	100-hp. Westinghouse variable-speed motors (2)	F. L. Smidth gear reducer and gears
	24	Coolers (2)	F. L. Smidth	Unax, 10 cyl. single row	Attached to kiln shell	
Kiln building	$23a_1$	Draft fans (2)	F. L. Smidth		100-ph. West'gh'se motors (2)	Belt
	$23a_2$	Dust chamber (Dust to wheelbarrows)				
	$23a_3$	Stack	Custodis	Concrete, 175-ft. (high), 8-ft. (inside diameter)		
Clinker handling and crushing	25	Conveyor	F. L. Smidth	Skipulter, 60-ft.	20-hp. Westinghouse motor	F. L. Smidth gear reducer
	26	Conveyor	F. L. Smidth	Skipulter, 90-ft.	20-hp. Westinghouse motor	F. L. Smidth gear reducer
	27	Conveyor	Jeffrey	Apron, 30-in. by 60-ft.	5-hp. Westinghouse motor	James gear reducer
	28	Crusher	Kennedy-Van Saun	Double-roll	40-hp. Westinghouse motor	Belt
	29	Elevator (To 30)	Link-Belt	16-in. by 35-ft., steel-inclosed	10-hp. Westinghouse motor	Link-Belt speed reducer
Gypsum receipt and handling		(From cars)				
	1a	Hopper				
	2a	Elevator (To 3a)	Link-Belt	16-in. by 40-ft., steel-inclosed	10-hp. Westinghouse motor	Link-Belt gear reducer
Finish grinding		(From 3a and 30)				
	31	Bins (3—1 gypsum, 2 clinker)		Mill-feed, concrete, 400-ton each		
	32	Feeders (4)	F. L. Smidth	Table-type	3-hp. Westinghouse motor	F. L. Smidth gear reducer
	33	Mills (2)	F. L. Smidth	Unidan, 4-compartment, 8-ft. by 36-ft.	900-hp. Westinghouse motors (2)	F. L. Smidth Symetro gear reducers
	34	Conveyors (2)	Link-Belt	Screw, 18-in. by 46 $\frac{3}{4}$-ft.	10-hp. West'gh'se motors (2)	F. L. Smidth speed reducers
	35	Elevators (2) (To $35a_1$ or 36)	Link-Belt	18-in. by 70-ft. steel inclosed	15-hp. Westinghouse motors (2)	F. L. Smidth speed reducers
Cement separating	$35a_1$	Separators (2)	F. L. Smidth	Mechanical type	50-hp. West'gh'se motors (2)	F. L. Smith gear reducer
		Cyclones (2)	F. L. Smidth		100-hp. West'gh'se motors (2)	Belt
		Fans (2) (Fines to $35a_2$; coarse to 33)	F. L. Smidth		2-hp. Westinghouse gear-motors (2)	
	$35a_2$	Conveyors (2) (To 36)	Link-Belt	Screw, 9-in. by 30-ft.		

(*Continued on page 47*)

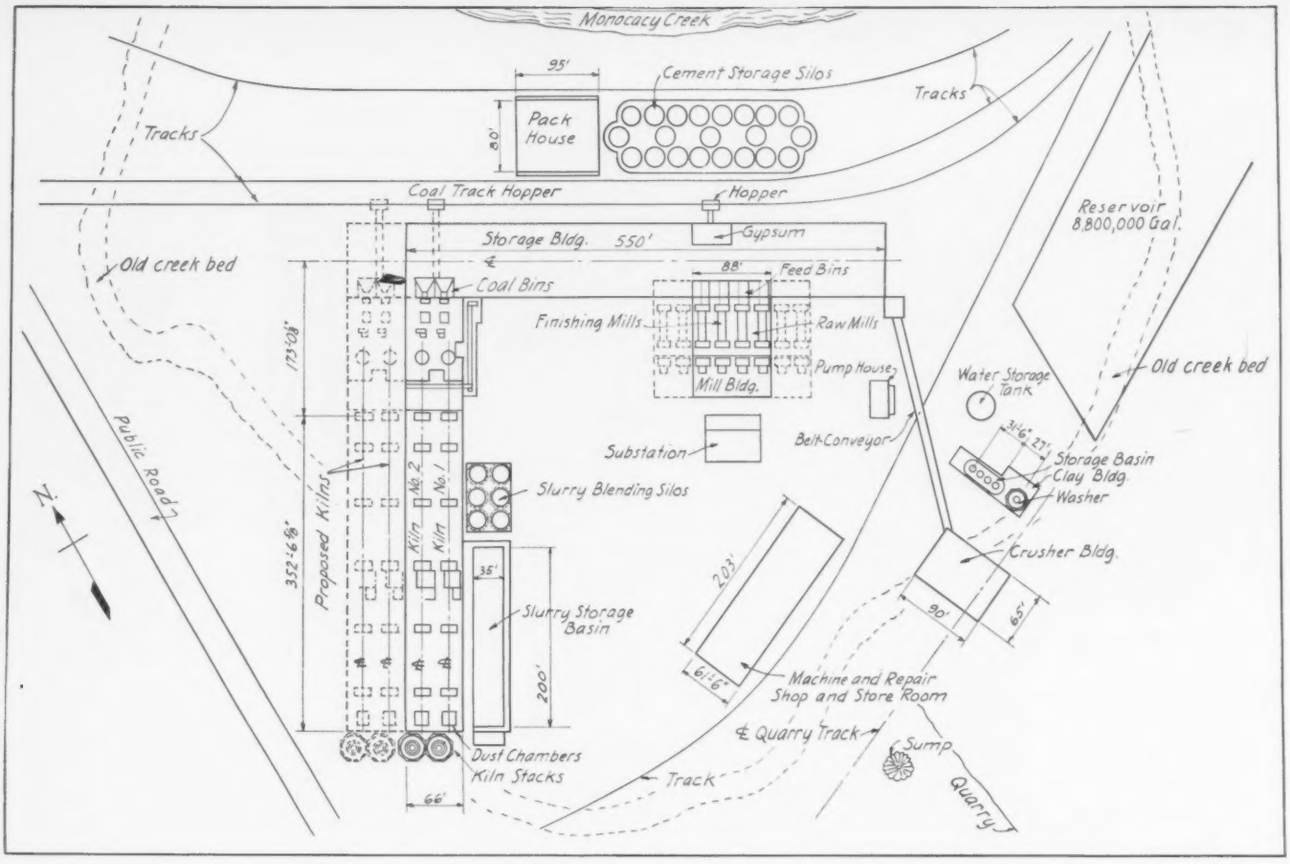
TABULAR ANALYSIS OF THE OPERATIONS AND EQUIPMENT OF THE NATIONAL PORTLAND CEMENT CO., BRODHEAD, PA. —Part II.

(Key numbers refer to corresponding numbers on accompanying flow-sheet.)

Operation	Key	Equipment	Make	Model No., Size, Capacity or Type	Power Source	Power Transmission
Cement handling and storage		(From 35 or $35a_2$)				
	36	Bin		Steel, 200-bbl.	3-hp. West'gh'se gear motor	
	37	Feeder	F. L. Smidth			
	38	Pump	F. L. Smidth	Fluxo	Air-operated	
	39	Storage silos (25) (To 40, or through spouts to cars)		Concrete, 10,000-bbl., ea.		
Cement handling, packing and shipping	40	Pumps (3)	Fuller-Kinyon	7-in., Type H, c.f.p.m.	100-hp. West'gh'se motors (3)	Direct-connected
	41	Bins (2)		400-bbl. ea., steel		
	42	Feeders (2)	F. L. Smidth	Screw	3-hp. West'gh'se motors (2)	Falk motor-reducer
		Agitators (2)	F. L. Smidth		3-hp. West'gh'se motors (2)	Falk motor-reducer
	43	Bag-packers (2)	F. L. Smidth	12-tube	.33-1-hp. West'gh'se motors (2)	
		Bag conveyor (Bags to 44; waste to $43a_1$)	F. L. Smidth	Slat-type	3-hp. motor	
	44	Conveyors (2) (To cars)		Portable, power driven and operated, 24-in.	2-hp. motors (2)	
Waste-cement reclamation		(Waste from 43)				
	$43a_1$	Pumps (2) (To 41)	F. L. Smidth	Fluxo	Air-operated	
Sack handling and cleaning		Elevator	Atlantic	Freight, 2-ton	10-hp. motor	
		Cleaner	Modern Valve Bag Co.	Bag-wheel	10-hp. Westinghouse motor	James gear reducer
Coal receipt and crushing		(From cars)				
	1b	Hopper		Steel		
		(From 16 or 6b)				
	2b	Conveyor	Jeffrey	Pan, 24-in. by 25-ft.	Driven from coal crusher	Belt
	3b	Crusher	Jeffrey	75-ton "Flex-Tooth" hammer-mill	50-hp. Westinghouse motor	Belt
		(From 3b or 6b)				
	4b	Conveyor	Jeffrey	Belt, 24-in. by 108-ft.	3-hp. Westinghouse motor	James gear reducer
	5b	Elevator (To 6b or 7b)	Link-Belt	16-in. by 55-ft., steel-inclosed	10-hp. Westinghouse motor	Link-Belt gear reducer
Coal grinding and feed to kiln		(From 5b or 6b)				
	7b	Bins (2)		Concrete, 120-ton each		
	8b	Feeders (2) (Hot air from 23, coal from 8b)	F. L. Smidth	Reciprocating and screw-type	2-hp. West'gh'se motors (2)	F. L. Smidth speed reducers
	9b	Driers (2)	F. L. Smidth	4-ft. 9 in. by 10-ft.	100-hp. West'gh'se motors (2)	F. L. Smidth gear reducer
	10b	Mills (2)	F. L. Smidth	4-ft. 9-in. by 16-ft.		
	11b	Cyclones (2) (Coal to 12b; air to 12b)	F. L. Smidth			
		Fans (2) (Air to 23)	F. L. Smidth		50-hp. West'gh'se motors (2)	
	12b	Bins (2)		20-ton each, steel		
	13b	Feeders (2) (To 23)	F. L. Smidth	Double-screw	2-hp. West'gh'se motors (2)	F. L. Smidth speed reducers
Storage building		(From 10)				
	11	Limestone (To 12) (From 29)		80-ft. by 550-ft., 200,000 bbl.		
	30	Clinker (To 31) (From 2a)		200,000-bbl.		
	3a	Gypsum (To 31) (From 5b)		1,800-ton		
	6b	Coal (To 4b or 7b)		15,000-ton		
		Overhead crane	P&H	80-ft. span	60-hp. motors (2)	
		Hoist	P&H	Single-drum	40-hp. motor	
		Bucket	Blaw-Knox	3-cu. yd., clam-shell	10-hp. motor	



Flow-sheet of National Cement Company's plant at Brodhead, Pa.



Concrete and foundation plan of the new plant of the National Portland Cement Co. at Brodhead, Pa.

rator consists of two units. One unit is similar to the usual air-separator but the other is a special type of cyclone dust-collector which operates in closed circuit with the separator. A Smidth fan built in with the separator acts as a fluffing unit which produces a dust cloud in the separator and an air lock preceding the separator controls the supply of air. The fine particles of cement in the separator are diverted with the air through a pipe to the inlet side of the cyclone. The oversize particles drop from the bottom of the separator to the mill for further reduction. An air lock is also provided at this point. The air-floated cement from the cyclone goes by gravity to the storage-bin described above. There is also an air lock between the bin and cyclone. The outlet pipe of the cyclone is connected to the suction side of a fan which assists in drawing the fine cement from the separator to the cyclone. The air from this fan enters the bottom of the separator and is recirculated.

A Smidth Fluxo pneumatic pumping system located under the storage-bins transports the finished cement through a pipe-line to the cement-storage silos into which the distribution is controlled by a series of valves and feed pipes. This installation consists of two tanks, each about 6½ ft. in diameter, with an automatic interlock which allows one tank to be filled with cement at the same time that the other tank is subjected to air pressure of about 30 lb. to discharge its material through the pipe-line. The cycle of operation is reversed automatically and causes a steady flow of material through the pipe. A feeder under the bin helps to control the feed of cement to this pumping system. Two Fuller Co. two-stage rotary compressors each rated at 750 cu.ft. per min. supply air at 100 lb. pressure for the Fluxo pumps and for agitation of the slurry. These are direct-connected to 125-hp. motors.

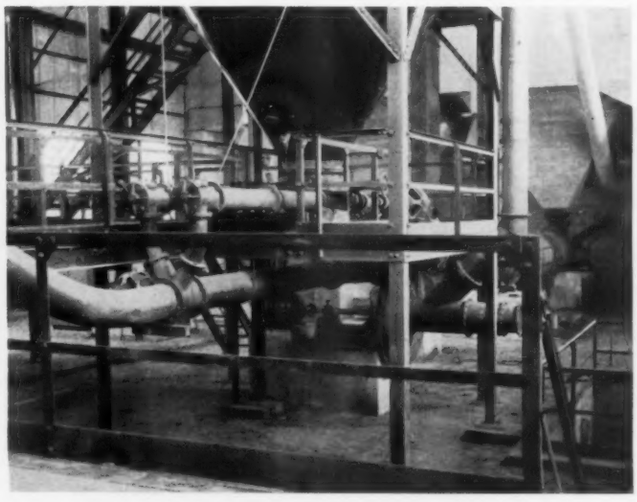
The cement storage consists of two parallel rows of eight reinforced-concrete silos separated by a center row of five additional silos which are so spaced as to form four additional compartments. Each silo is 25 ft. in diameter and 76 ft. high. As each silo and compartment has a capacity of 10,000 bbl., there is a total storage capacity of 250,000 bbl. A 13-ft. basement below the silos is above the car-loading track-level and houses the cement pumps and compressors. The 16 silos forming the two outer rows are provided with spouts so that bulk cement can be loaded direct into railway cars. Each spout has a cut-off valve which can be controlled from the car or from ground level. Air jets inside the silos insure a steady flow of cement to these spouts and to the pump feed openings.

Three 7-in. Fuller-Kinyon Type H pumps are mounted on carriers running on tracks under the three rows of silos. These can be moved so as to take cement from any desired silo or compartment through 33 openings and convey it to two bag-packer feed-bins in the adjacent pack-house. The

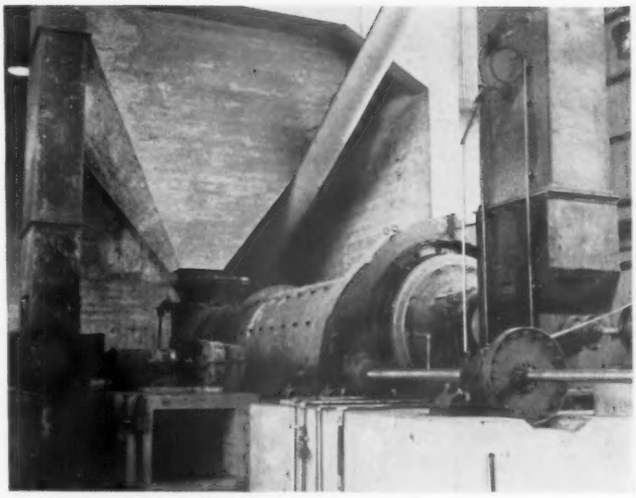
cement transport lines are also arranged so that cement can be transported from one silo to another. Three Fuller Co. 500-cu.ft. per min. single-stage rotary compressors located in the silo basement supply air at about 40 lb. pressure for these pumps, for air agitation of the cement, and for general use in the pack-house. These are driven by 75-hp. direct-connected motors.

Each of the two steel feed-bins in the pack-house has two compartments with a capacity of 400 bbl. each and discharges through a Smidth air-agitated feeder to one of the two Smidth Fluxo bag-packers. As these packers are comparatively new to the cement industry in this country a brief description of their operation should be of interest. Each of these machines consists of a cylindrical supply tank on which are mounted 12 filling spouts with associated weighing mechanisms. This tank rotates slowly about its vertical axis and the starting and the interrupting of the flow of cement to the bags, as well as the discharge of the filled bags, are entirely automatic. The sole duty of the attendant is to slip a bag on each spout as it passes him. Each packer is said to have a capacity of 1,500 to 1,600 bags per hr. Sacks of cement are discharged from the packers by short slat conveyors to two Smidth motor-operated and motor-driven portable belt-conveyors, 24 in. wide by 25 ft. long, mounted on wheels. These take them into the cars on both sides of the building for stacking. They are equipped with United States rubber belting. Each of the four packer-feed compartments has high- and low-level bin signals so that the pack-house crew and the pump operator under the silos are kept informed of conditions.

Each packer is connected to an individual Smidth bag-type dust-collector which returns the collected cement to the packer feed-bins. Under each packer is a small Fluxo pump which returns spilled cement to the feed-bin. An Atlantic 4,000-lb. freight elevator carries the sacks, etc., to and from the second and third floors of the pack-house. On the second floor is a Modern Valve Bag Co. bag-cleaning wheel which is connected to a Sly dust-collector with an American Blower Co. "Sirocco" Size 35-E fan on the floor above.



Double-screw feeder which takes coal from bin to kiln-feed pipe. Air-blast fan is at right.



One of the two combination coal-drying and grinding mills. Coal conveyor and elevator in background.

The dust created in this plant is controlled by the inclosure of all possible units of equipment. Dust-collectors are also installed in the various departments where the most dust is present. A Northern Blower Co. collector alongside the crusher building is connected to the crushers and stone elevator. Smidth collector units serve the two finish-grinding mills and other equipment in this department. In the pack-house two Smidth collectors serve the bag-packers and a Sly collector with an American "Sirocco" fan is connected to the bag-cleaning wheel as already mentioned.

Ample water is available for the operation of this plant. Monocacy Creek traverses the property through a new channel and supplies two wells having a capacity of 1,000 gal. per min. each. An 8,800,000-gal. earth-fill reservoir insures an ample supply during dry seasons. There are two pump houses located 600 ft. apart, each with a deep-well pump delivering to an inclosed sump from which two multiple-stage centrifugal pumps can supply water direct to the various plant departments or to a 50,000-gal. water-tank mounted on a 100-ft. steel tower. In case of fire water is supplied either by this tank or another centrifugal pump with a capacity of 1,000 gal. per min. There is also a special pump to draw water direct from Monocacy Creek during periods of high water and a small pump for drinking water. Worthington pumps are used exclusively.

All the plant buildings are of the most modern fireproof types of construction. With a few exceptions, they are of steel-frame construction with Keasby & Mattison corrugated cement-asbestos roofing and siding. Conveyor galleries also are entirely of steel and are similarly inclosed. The electric substation, pump-houses, mill-motor room and the shop building are built of concrete brick with steel roof girders. The crusher building is entirely inclosed with Robertson protected metal which is also used to roof the shop and slurry-basin buildings.

The various miscellaneous departments usually found scattered about a cement plant are housed in one conveniently-located building which is 200 ft.

Main storage building and cement-storage silos. Gypsum track-hopper and elevator in center.

long and 66 ft. wide. The machine-shop section is completely equipped to make all except major repairs. The equipment includes 60-in. and 18-in. lathes, a 24-in. shaper, a 54-in. radial drill, an 18-in. drill press, bolt and pipe machines, punch, shear, high-speed cut-off shear, grinder, etc. Minor electrical repairs are also made. In the same building is a storeroom where a complete stock of repair parts and supplies is carried, a first-aid room, etc. A 5-ton Chisholm-Moore overhead crane serves the entire building.

The first building erected on this property is the combination office and laboratory. There is complete equipment for the making of all necessary chemical and physical tests, including a Tyler Ro-Tap sieve shaker, Baldwin-Southwark 18,000-lb. compression tester, Riehle briquette tensile tester, miniature fine and coarse crushers, moist and hot closets, still, etc.

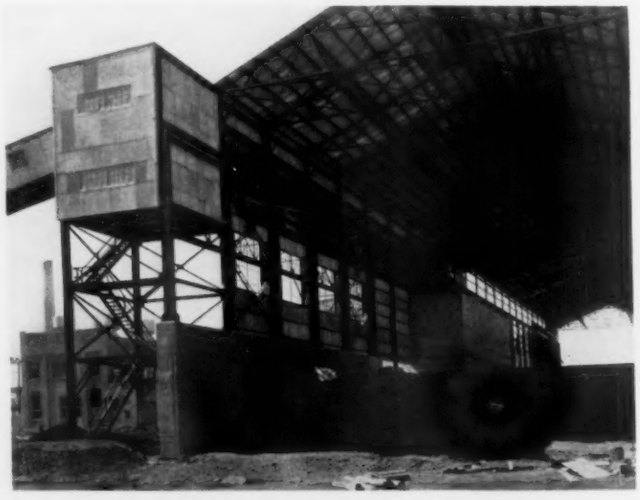
The control of the power supply and the arrangement of transformers and switching equipment are of interest. The initial installation is estimated to require approximately 4,000 kv.-a., and the final plant 7,500 kv.-a. Power is supplied over two circuits at 33 kv. from the Glendon sub-station of the Metropolitan Edison Co. approximately 10 mi. distant. These two circuits follow different routes between the substation and the plant, and consequently offer a maximum of reliability. The two lines meet on a common switching structure just outside the plant substation building, where air-break switches are provided for disconnecting the high-voltage circuits from the cement-company substation.

A careful study was made of the transformer requirements for the initial and final capacity of the mill. The arrangement adopted is the ultimate use of three 2,500-kv.-a. transformers, of sufficient size to carry the ultimate requirements for the plant, and as two of these transformers operating open delta will carry the present load requirements, it was not considered necessary to purchase the spare transformer until the growth of the plant requires the additional capacity.

On account of the physical location of this plant with respect to the power system of the Metropolitan Edison Co., the short-circuit requirements on the 2,300-v. station bus would ordinarily require an oil switch rated at 100,000 kv.-a. rupturing capacity, and the use of unnecessarily large 2,300-v. cables. In addition to the short-circuit current delivered by the power company's cables, the synchronous motors in the plant, which will ultimately aggregate 6,800 kv.-a., contribute about 50,000 additional kv.-a. short-circuit.

As 2,300-v. switches having sufficient capacity to open short-circuits under these conditions would be very expensive, the transformers were designed with two 2,300-v. low-tension windings so arranged that the impedance from 33,000 to 2,300 v. is approximately 8 per cent., but the impedance between the two 2,300-v. windings themselves is 16 per cent. By dividing the synchronous motors so that there would be four motors on each bus it was possible to use 2,300-v. switches having only 50,000-kv.-a. rupturing capacity, which reduced the cost of the oil circuit-breaker installation about 50 per cent.

The two 33-kv. lines are provided with lightning arresters on the outside of the cement company's



The main storage building with conveyor from crusher building at left. Overhead crane shown loading mill-feed bins.

substation, and each line has a 33-kv. oil circuit-breaker inside the substation. These breakers are provided with relays which will trip the switch for power leaving the station, and another set of differential relays operate to trip both oil switches in the event of a transformer failure. From the oil switches the lines go to a common bus and after passing through the metering transformers of the power company are connected to the high-tension side of the three 2,500-kv.-a. transformers composing the main bank. From the low-tension side of these transformers copper strap passes through a brick wall between the transformer house and the 2,300-v. switches.

From the 2,300-v. switches power is distributed to the kiln building (900 kv.-a.), mill building (450 kv.-a.), packing department (450 kv.-a.), and raw rock department (750 kv.-a.). The 2,300-v. lines from the substation are run in underground cable

laid directly in the ground without the use of conduit. At the above-mentioned locations transformer banks are installed on concrete pads and completely inclosed on both sides and the top by a metal fence.

The control for the entire 33,000- and 2,300-v. power supply, the two 300-kv. motor-generator sets supplying 250-v. d.-c. current to the plant, and the four large synchronous motors driving the raw and clinker mills, is located in the motor room of the mill building only a few feet from the substation. By arrangement with the power company all raw and finish grinding is done at night or off "peak" to secure a low power rate. Motors were chosen so that a 100-per cent. power factor can be maintained on both day and night loads.

The main switchboard consists of 26 panels and includes blank panels for the control of various equipment, so that the controls for each group will be together. The switchboard operator has control of all circuits leaving the substation, and in addition, the starting and control of the large grinding mills and the motor-generator sets. Each circuit is provided with a watt-hour meter, so that the power supplied to the different departments can be determined for allocation of costs.

In order to eliminate the use of a storage battery and charging set, static rectifiers of copper oxide type are used for control of the oil circuit-breakers. With this arrangement it is necessary, in the event that the plant is dead, to close one of the 33-kv. switches manually, but once the transformer bank has been energized, all other control operations can be accomplished electrically.

As a prolonged interruption of the power supply might result in damage to the long kilns, a Hall-Scott 400-hp. gasoline engine is provided as a stand-by, with sufficient capacity to rotate both the kilns while they are cooling, to prevent warping, and also to supply sufficient power to agitate the slurry. The gasoline engine is flexibly coupled to one of the motor-generator sets through a Bethlehem slip coupling. The coupling is entirely automatic and is so designed that while the engine will run the motor-generator set by merely starting the engine, it is impossible to run the gasoline engine from the motor-generator set, as might be done with the conventional coupling. The motor-generator set, being composed of a d.-c. generator and a synchronous motor, may be used to supply both a.-c. and d.-c. current when driven by the gasoline engine.

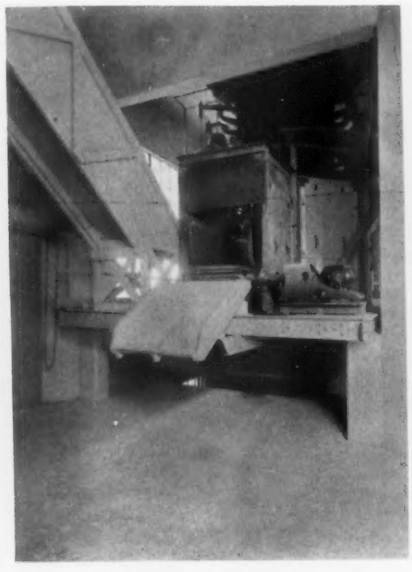
A very complete electrical control system for the supervision of each department was installed by the F. L. Smidth Co. in the grinding, burning, and packing departments.

The control of the crushing department is of interest as the entire crushing and transport operation is controlled from a central point. A panel controls the operation of the three crushers, the belt-conveyors, and the dust-collecting equipment, so that the crusher operator has under his control and observation the operation of everything in connection with the crushing and transportation of the raw rock. Diagonally across the track from the crusher control panel is a hoist man who hoists the cars from the quarry and dumps the contents into the feeder hopper.

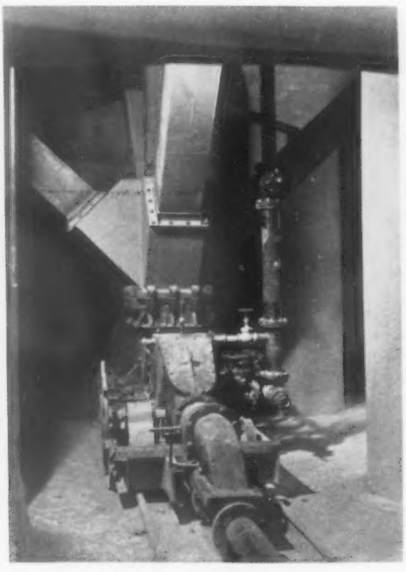
The Westinghouse Electric & Mfg. Co. furnished all the motors and electrical equipment for the operation of the plant and collaborated with the engineers of the E. M. Gilbert Engineering Corp. in working out the electrical design.

The property and plant are at Brodhead, Northampton County, about 5 mi. north of Bethlehem and 7 mi. northeast of Allentown, Pa., near the eastern fringe of the Lehigh Valley cement district. They are at the intersection of state highways which lead in from four directions. The plant is connected by a switch track to the main line of the Lehigh & New England Ry. which traverses the northern boundary of the property. This line also makes direct connections with the Central R. R. of New Jersey, the Lehigh Valley R. R., the Delaware, Lackawanna &

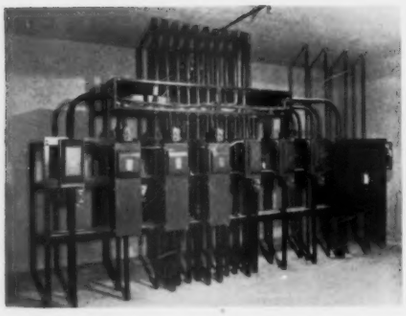
Dust-collecting unit in pack-house which is connected to bag-cleaner.



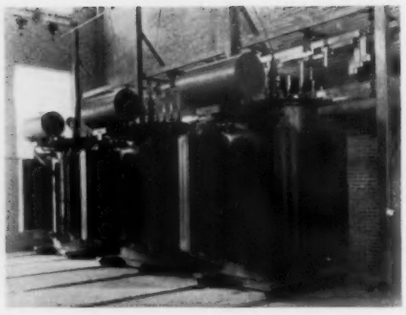
One of the two 12-spout revolving bag-packers with slat conveyor.



One of the pneumatic pumps mounted on rails under the cement-storage silos.



Switch boxes and conduit in basement of mill building.



The power condensers in the small power-house.

Main switchboard in mill-motor room which controls all plant operations.

Western R. R., the Pennsylvania R. R., and the Reading R. R. A total of 6,000 ft. of trackage on the property provides ample space for the receipt, storage and shipment of supplies and products.

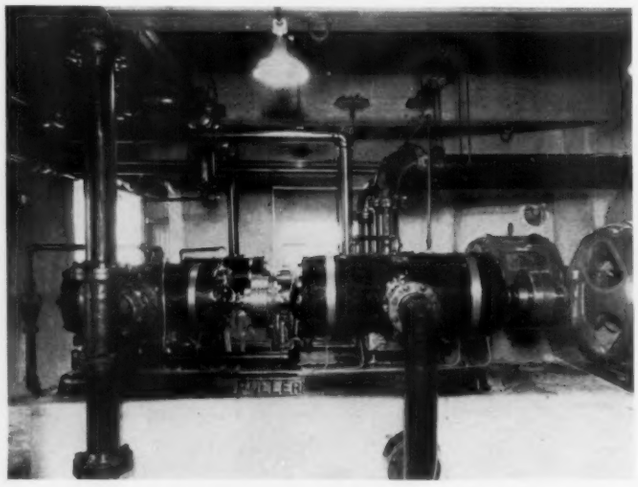
A. P. Hachtmann is chief engineer for the company and it was under his supervision that the general design of the plant was made by the company's engineering corps. Mr. Hachtmann also supervised the construction of the plant and the installation of the equipment. The various manufacturers furnishing the major equipment designed their installations to fit the general plan. H. Hardvendel, who superintended the installation of equipment for F. L. Smidth & Co., is plant superintendent. Evan Guth is chief chemist.

The M. A. Long Co., engineering and construction firm of Allentown and Chicago, with home offices in Baltimore, made the detailed drawings and had the general contract for the construction of all the buildings and foundations. This company, within 10 days after the awarding of the contract, had its equipment and organization on the site ready to begin operations. Because of the size of the job it was decided to set up a central concrete-mixing plant, the product of which was delivered to the required points at the rate of 50-cu.yd. per hour by a single Pumpcrete made by the Chain Belt Co. This machine was installed directly below a 1-cu.yd. tilting mixer, above which was erected a 100-ton portable storage-bin having volume batchers suspended over the mixer hoppers. No water being at that time available, a large storage tank was built and water was pumped from the creek. A hot-water boiler to heat the aggregates and to supply hot water for the mixing of the concrete in the winter was provided. By placing the plant in a central location the length of necessary pipe-line for delivering the concrete was only about 600 ft.

F. L. Smidth & Co., New York, N. Y., furnished most of the equipment for the plant, including the kilns, coolers, raw-material and clinker grinding mills, coal mills and driers, clinker conveyors, air-separators, slurry and clay agitators, clay wash-mill, bag-packers, cement-transport system, speed-reducers, etc. The Kennedy-Van Saun Mfg. & Engr. Corp. supplied all the equipment for the crusher building, including feeders, primary and secondary crushers, vibrating screen, clinker crusher, etc. The Fuller Co. supplied the pneumatic transport system between the silos and the pack-house and all the rotary air-compressors. The two quarry shovels and an overhead traveling crane were supplied by the Harnischfeger Corp., and the quarry locomotives and balanced hoist by the Vulcan Iron Works. The Link-Belt Co. furnished all the bucket-elevators and screw-conveyors as well as some of the speed-reducers, etc., and the Jeffrey Mfg. Co. the clinker and coal apron conveyors, all the belt-conveyors and the coal crusher. Goodrich rubber belting is used on all the conveyors. Wilfley slurry and clay slip pumps, Worthington deep-well and water pumps and Merco-Nordstrom valves are used exclusively. The kiln stacks were erected by the Alphonse Custodis Chimney Co. The kilns are lined with Harbison-Walker firebrick. The Westinghouse Electric & Mfg. Co. supplied all the motors except for a few which are integral parts of equipment units, and most of the other electrical equipment. Keasbey & Mattison corrugated cement-asbestos and Robertson protected metal roofing and siding, Blaw-Knox "Electroforged" steel grating and flooring, and Crouse-Hinds conduit are used.

Fred B. Franks, Sr., vice-president and general manager of the National Portland Cement Co., is a pioneer cement-plant builder and operator in the Lehigh Valley district and has been actively identified with this industry for almost half a century. Other plants whose construction and operation he supervised were those of the Martin's Creek Portland Cement Co., Martin's Creek, Pa., now owned by the Alpha Portland Cement Co., the Bath and Sandt's Eddy, Pa., plants now owned by the Lehigh

(*Continued on page 60*)



The two rotary compressors under the slurry silos which provide air for slurry agitation.

Amended Lime Code Embodies Matured Principles of NRA Supervision

ON April 1 the National Industrial Recovery Board approved an Amended Code of Fair Competition for the lime industry, which takes the place of the code approved by the President on October 3, 1933. The new code became effective on April 11.

Embodied in the amended code are new provisions reflecting the altered policies of the National Recovery Administration, and other provisions which have been changed in the light of the experience acquired in operating under the old code.

The principal points of difference between the amended code and the original code may be summarized as follows:

Art. I—Purposes.—This replaces the old preamble and makes the code binding on all members of the industry.

Art. II—Definitions.—This contains more comprehensive definitions, broadening the scope of lime products to include by-product material or products competitive with lime produced in a lime plant.

Art. III—Hours of Labor.—According to this article overtime is calculated after the completion of a 40-hr. week as well as an 8-hr. day; it allows the averaging of hours over a 3-month, instead of a 6-month, period; permits employees to work 56 hr. a week but not more than 6 days in 7; and makes foremen engaged in manual labor amenable to the maximum-hours provisions even though their compensation rate may be $35 a week or more.

Art. IV—Wages.—The new provisions transfer Rockcastle County, Ky., from the northern (37½ c.) rate area to the southern (30 c.); make semimonthly payment of wages in lawful currency or negotiable check mandatory; require that all labor, other than common or totally unskilled, be paid at rates above the minima; and require that the employer maintain proper wage differentials for different types of skilled labor and that necessary adjustments be made within 30 days of the effective date of the code.

Art. V—General Labor Provisions.—This forbids the employment of children under 18 yr. of age except in certain occupations, and requires employers to furnish a reasonably safe place in which to work.

Art. VI—Code Authority.—By this article membership is limited to 20 members of whom 4 must be elected by non-members of the National Lime Assn.; and the Code Authority is empowered to sue in its own name for the collection of assessments ordered under an approved budget and basis of contribution.

Art. VII—Reports.—This requires the filing with a confidential agency of the Code Authority of reports of shipments, plant capacity, and other needed information, which will be kept confidential.

Art. VIII—Marketing.—This eliminates the weighted-average-cost provisions of the old code but allows the declaring of emergencies in the event of wilfully-destructive price-cutting. It provides that basing points for railway shipments only are to be determined by District Control Committees and low-rate areas must be designated. Each plant is its basing point for highway and waterway shipments.

All price lists will be kept on file at the Washington office of the Code Authority for inspection, and that office will receive and distribute price lists for districts having no confidential agents. Price lists for railway shipments are to be filed only at the basing point serving the plant of the manufacturer filing them and with a confidential agency chosen by the District Control Committee. The filing of one-day prices is forbidden.

Art. IX—Trade Practice Rules.—All contracts or commitments, made at prices below those published, must be filed within 30 days after the effective date of the new price publication.

As this amended code is the first nonmetallic-mineral industry code to embody the most recent N.R.A. policies, it is reprinted here on account of its interest to producers other than those making lime as well as because of its importance to lime makers themselves. The original lime code was reprinted in full in the November, 1933, issue of PIT AND QUARRY, pp. 18-21, 32.

AMENDED CODE OF FAIR COMPETITION FOR THE LIME INDUSTRY

(Approved April 1, 1935; Effective April 11, 1935)

ARTICLE I—PURPOSES

To effectuate the policies of Title I of the National Industrial Recovery Act this code is established as a Code of Fair Competition for the lime industry, and its provisions shall be the standards of fair competition for such industry and be binding upon every member thereof.

ARTICLE II—DEFINITIONS

Sec. 1.—Wherever used in this code or any supplement appertaining thereto, the terms enumerated in this Article II shall have the meanings herein defined, unless the context shall otherwise clearly indicate.

Sec. 2.—The terms "President," "Act," "Board" and "Code" shall mean respectively the President of the United States, Title I of the National Industrial Recovery Act, the National Industrial Recovery Board as created by Executive Order No. 6859 of September 27, 1934, and the Code of Fair Competition for the lime industry as approved on October 3, 1933, as amended.

Sec. 3.—The term "lime industry" or "industry" includes the mining or quarrying of limestone (calcareous or dolomitic) for use in the manufacture of industry products, and/or the manufacture of lime by the burning of such limestone and/or other calcareous materials, and/or the processing of industry products and the original sale of industry products by a member of the industry, directly or indi-

rectly, either by himself or his agent, and includes without limitation any person or corporation occupying a subsidiary or controlling relationship or one of common, mutual or joint ownership or control to a member of the industry.

Sec. 4.—The term "industry products" includes:

(a) Lime—a product manufactured by the burning of limestone (calcareous or dolomitic) and/or other calcareous materials composed of the oxide or hydroxide of calcium and/or calcium and magnesium as the principal constituent and sold for industrial, construction or agricultural uses.

(b) Slaked lime.

(c) Masonry cement of which the principal constituent is the oxide or hydroxide of calcium and/or calcium and magnesium, and which is manufactured at a lime plant.

(d) Such other products, natural or processed, of which the principal constituent is the oxide or hydroxide of calcium and/or calcium and magnesium.

(e) The calcareous or dolomitic by-products of other industries, not including agricultural limestone, sold or offered for sale in competftion with industry products of this industry. Industry products shall also include burned limestone (calcareous or dolomitic) used for refractory and/or fluxing purposes irrespective of the extent of burning or other refinements after burning.

(f) For the purposes of this code members of the industry manufacturing and/or selling as an original sale dolomitic lime for refractory purposes irrespective of the extent of burning or other refinements, shall be governed by the provisions outlined in Schedule "B" attached hereto and made a part of this code.

Sec. 5.—The term "member of the industry" includes, but without limitation, any individual, partnership, association, corporation or other form of enterprise engaged in the industry either as an employer or on his or its own behalf.

Sec. 6.—The term "employer" means and includes anyone by whom any such employee is employed or compensated.

Sec. 7.—The term "employee" means and includes any individual engaged in the industry in any capacity receiving compensation for his services, irrespective of the nature or method of payment of such compensation, except a member of the industry.

Sec. 8.—The term "district," unless the context otherwise clearly indicates, shall mean a lime-industry manufacturing district established in schedule "A" of this code attached hereto and made a part hereof.

Sec. 9.—The term "low-rate area" shall mean that area surrounding a rail basing point established by the District Control Committee as provided for in Article VIII, Sec. 2, Subsec. (b), which shall include all destinations to which such basing point has a minimum car-load rail freight rate for industry products manufactured in such low-rate area, lower than or equal to the minimum car-load rail freight rate from another rail basing point on like industry products of similar grade and quality.

Sec. 10.—The term "dealer" includes, but without limitation, any individual, partnership, association, corporation or other form of enterprise, either as an employer or on his or its own behalf, regularly engaged in the business, in whole or in part, of purchasing industry products at wholesale for resale and/or distribution as a retailer. For the purposes of this code the term "dealer" includes, but without limitation, "building supply dealers" and "agricultural dealers," who are described as follows:

(a) A "building supply dealer" is defined as any individual, partnership, association, corporation, or other form of enterprise engaged either as an employer or on his or on its own behalf engaged in the builders' supply trade, buying at wholesale for resale at retail.

(b) An "agricultural dealer" is defined as a dealer in agricultural supplies who purchases agricultural lime in wholesale quantities for resale at retail, and who regularly solicits the business of and renders a dealer service to agricultural consumers in his locality.

Sec. 11.—A "jobber" is any individual, partnership, association, corporation, or other form of enterprise who buys industry products and resells at wholesale for his own account.

Sec. 12.—An "agent" is any individual, partnership, association, corporation, or other form of enterprise regularly engaged in selling industry products on a commission basis for a member or members of [the] industry to retailers and/or consumers with whom he is not connected or related in business. For the purposes of this code the term "agent" shall mean jobbers, distributors or brokers, but provided further, that "jobber" as herein referred to is in contradistinction to the term "Jobber" as used in Sec. 11.

Article III—Hours of Labor

Sec. 1. *Maximum Hours.*—No employee, except as herein otherwise provided, shall be permitted to work in excess of 40 hr. in any one week or 8 hr. in any 24-hr. period; or more than 6 days in any 7-day period.

Exceptions as to Hours

Sec. 2.—The maximum number of hours established in the foregoing Sec. 1 of this Article III shall not apply to:

(a) Watchmen, who shall be permitted to work not more than 56 hr. in any one week.

(b) Persons engaged during any period in which a concentrated demand shall place an unusual or temporary burden upon production facilities, or to meet seasonal or peak requirements or production emergencies; provided, however, that any employee so employed shall be paid not less than 1½ times the regular wage rate for all hours worked in excess of 40 hr. in any one week, or 8 hr. in any 24-hr. period, and provided further, that in no event shall the total working hours of any such employee so employed averaged over a 3-month period exceed 40 hr. per week.

Sec. 3.—The maximum provisions established in the foregoing Sec. 1 of this Article III shall not apply to:

(a) Employees engaged in emergency maintenance or emergency repair work involving breakdown or protection of life or property; provided, however, that not less than 1½ times the regular wage rate for any employee so employed shall be paid for all hours worked in excess of 40 hr. in any one week, or 8 hr. in any 24-hr. period.

(b) Persons in a managerial, executive, supervisory or technical capacity and their immediate assistants (excluding skilled production workers); provided, that this exception shall apply to no such employee who is paid less than at a rate of $35 per week. This exception, however, shall not be so construed as to include foremen regularly engaged in manual labor.

(c) Outside sales and sales service employees.

Sec. 4. *Employment by Several Employers.*—No employer shall knowingly permit any employee to work for any time which, when added to the time spent at work for another employer or employers in this industry or any other industry, or in any trade, exceeds the maximum permitted herein.

Article IV—Wages

Sec. 1. *Minimum Wages.* — No employee, except as herein otherwise provided, shall be paid in any pay period less than at the rate of 30 c. per hr. in all territory south of the northern boundary of Virginia, Tennessee, Oklahoma, New Mexico, Arizona, Arkansas, and that section of southwestern Missouri included within the boundaries of Jasper, Lawrence, Greene, Newton and McDonald Counties, known as the manufacturing section, and in all other territory no employee shall be paid less than at the rate of 37½ c. per hr., except in Rockcastle County, Kentucky, where the 30 c. minimum rate shall apply. This minimum wage shall apply only to common or totally unskilled labor. Other classes of labor shall be compensated at rates above such minimum.

Sec. 2. *Piecework Compensation; Minimum Wages.*—This Article IV establishes a minimum rate of pay for any pay period which shall apply, irrespective of whether an employee is actually compensated on a time rate, piecework, or other basis.

Sec. 3. *Clerical and Office Employees.*—No clerical or office employee, or watchman, shall be paid in any period less than at the rate of $15 per week in any city of over 500,000 population, or in the immediate trade area of such city; or less than at the rate of $14.50 per week in any city of between 250,000 and 500,000 population, or in the immediate trade area of such city; or less than at the rate of $14 per week in any city of between 2,500 and 250,000 population, or in the immediate trade area of such city; or less than at the rate of $12 per week in any city of less than 2,500 population. Population for the purposes of this paragraph shall be determined by reference to the 1930 Federal Census.

Sec. 4. *Wages Above the Minimum.*—Adjustments of wages with respect to wages above the minimum shall be made within 30 days after the effective date of this code by each employer who has not heretofore made such adjustments since the enactment of the National Industrial Recovery Act. Such adjustments shall mean the maintenance of a differential at least as great in amount as that existing between the wage rates for such employment and the then-existing minima subsequent to the date of the last adjustment made prior to the code approved October 3, 1933. In no event, however, shall hourly rates of wages be reduced in making such adjustments. Within 60 days after the effective date of this code each member of the industry shall make a report of such adjustment whether made prior to or subsequent to the date of approval of this code to the Code Authority.

Sec. 5. *Handicapped Persons.*—A person whose earning capacity is limited because of age or physical or mental handicap or other infirmity may be employed on light work at a wage below the minimum established by this code if the employer obtains from the state authority designated by the United States Department of Labor a certificate authorizing his employment at such wages and for such hours as shall be stated in the certificate. Each employer shall file monthly with the Code Authority a list of all such persons employed by him, showing the wages paid to, and the maximum hours of work for such employees.

Sec. 6. *Payment of Wages.*—Each employer shall make payment of all wages in lawful currency, or by negotiable check therefor, payable on demand. These wages shall be exempt from any deductions other than those voluntarily authorized to be deducted by an employee or required by law. Pay periods for wages shall be at no greater interval than every semi-month, and salaries at no greater interval than every month. No employer shall withhold wages except as otherwise provided hereinabove. Unused merchandise tokens or store orders issued to employees and held by them at the end of a pay period shall be redeemed in cash or by negotiable check.

Article V—General Labor Provisions

Sec. 1. *Child Labor.*—No person under 18 yr. of age shall be employed in the industry, except in clerical, office, sales, service, technical and engineering department office duties, and no person under 16 yr. of age shall be employed in any capacity. In any state an employer shall be deemed to have complied with this provision as to age if he shall have on file a certificate duly signed by the authority of such state empowered to issue employment or age certificates or permits showing that the employee is of the required age.

Sec. 2. *Provisions of the Act.*—Employees shall have the right to organize and bargain collectively through representatives of their own choosing and shall be free from the interference, restraint, or coercion of employers of labor, or their agents, in the designation of such representatives or in self-organization or in other concerted activities for the purpose of collective bargaining or other mutual aid or protection.

(a) No employee and no one seeking employment shall be required as a condition of employment to join any company union or to refrain from joining, organizing, or assisting a labor organization of his own choosing.

(b) Employers shall comply with the maximum hours of labor, minimum rates of pay, and other conditions of employment approved or prescribed by the President.

Sec. 3. *Reclassification of Employees.*—No employer shall reclassify employees or duties of occupations performed or engage in any other subterfuge so as to defeat the purposes or provisions of the act or of this code.

Sec. 4. *State Laws.*—No provision in this code shall supersede any state or Federal law which imposes on employers more stringent requirements as to age of employees, wages, hours of work, or as to safety, health, sanitary or general working conditions, or insurance, or fire protection, than are imposed by this code. Standards for safety and health shall be submitted by the Code Authority to the Board for approval within 3 months after the effective date of this code, and when approved by the Board shall have the same effect as other provisions of this code.

Sec. 5. *Posting.*—All employers shall

post and keep posted copies of this code in conspicuous places accessible to all employees. Every member of the industry shall comply with all rules and regulations relative to the posting of provisions of Codes of Fair Competition which may from time to time be prescribed by the Board.

Sec. 6. *Dismissal for Complaint.*—No employer shall dismiss or demote any employee for making a complaint or giving evidence with respect to an alleged violation of the provisions of any Code of Fair Competition.

Sec. 7. *Company Towns and Stores.*—Employees other than maintenance or supervisory men, or those necessary to protect property, shall not be required as a condition of employment to live in houses rented from or specified by the employer. No employee shall be required, as a condition of employment, to trade at a store owned or specified by an employer.

ARTICLE VI—ORGANIZATION, POWERS AND DUTIES OF THE CODE AUTHORITY

Sec. 1. *Organization and Constitution.*—A National Code Authority is hereby constituted to administer the provisions of this code, and shall consist of not more than 20 voting members. Sixteen of such voting members (one from each district designated in Schedule A of this code) shall be appointed from and by the Trade Relations Committee of the National Lime Assn.; provided, that each of such members is a member of the industry and a member of the National Lime Assn. and is truly representative of the district which he purports to represent. Four of such voting members shall be elected by members of the industry who are not members of the National Lime Assn.; provided, that the members elected are truly representative of the non-association members of the industry throughout the United States. Such appointments and said elections shall be subject to the approval of the National Industrial Recovery Board.

(a) An executive committee to consist of 5 members, including at least one representative of non-association members, selected from and by the Code Authority, shall be constituted and act in the capacity of supervisory agent or the general advisers to the Code Authority; provided, that the executive committee shall have no powers except as may be legally and by proper resolution delegated to it by the Code Authority, subject to the approval of the National Industrial Recovery Board.

(b) Elections shall be promptly held and appointments promptly made. Upon approval of elections and appointments by the National Industrial Recovery Board, the term of office of voting members shall commence and continue for the period of one year, or less, as may be determined by operation of law. Notice of vacancy of office of any of the voting members elected or appointed and approved as aforesaid shall be promptly communicated to the appropriate electorate with instructions promptly to meet and elect a successor to serve for the balance of the term of office, or such other term of office as circumstances may require, subject to the approval of the National Industrial Recovery Board. Upon failure by members of the industry promptly to elect or appoint members or their successors, as aforesaid, the National Industrial Recovery Board may appoint such voting members as it, in its discretion, may deem necessary and best designed to effectuate the purposes of the provisions of this code and the policy of Title I of the National Industrial Recovery Act.

Sec. 2.—In addition to the above membership the National Industrial Recovery Board may appoint 3 members without vote and without compensation from industry, otherwise to act as members of the Code Authority for such terms as said Board may specify.

Sec. 3.—Each trade or industrial association directly or indirectly participating in the selection or activities of the Code Authority shall: (1) impose no inequitable restrictions on membership, and (2) submit to the National Industrial Recovery Board true copies of its articles of association, by-laws, rules and regulations, and any amendments when made thereto, together with such other information as to membership, organization and activities as the National Industrial Recovery Board may deem necessary to effectuate the purposes of the Act.

Sec. 4.—In order that the Code Authority shall at all times be truly representative of the industry and in other respects comply with the provisions of the act, the National Industrial Recovery Board may prescribe such hearings as it may deem proper; and thereafter, if it shall find that the Code Authority is not truly representative or does not in other respects comply with the provisions of the act, may require an appropriate modification in the method of selection of the Code Authority.

Sec. 5.—Nothing contained in this code shall constitute the members of the Code Authority partners for any purpose. Nor shall any member of the Code Authority be liable in any manner to anyone for any act of any other member, officer, agent or employee of the Code Authority. Nor shall any member of the Code Authority, exercising reasonable diligence in the conduct of his duties hereunder, be liable to anyone for any action or omission to act under this code, except for his own wilful malfeasance or nonfeasance.

Powers and Duties

Sec. 6.—Subject to such rules and regulations as may be issued by the National Industrial Recovery Board and to the extent permitted by the act, the Code Authority shall have the following further powers and duties:

(a) To make investigations as to the functioning and observance of any provisions of this code at its own instance or upon complaint of any person affected, and to report thereon to the Board.

(b) To insure the execution of the provisions of this code and provide for the compliance of the industry with the provisions of the act.

(c) To adopt by-laws and rules and regulations for its procedure and for the administration of this code. The Code Authority shall promptly furnish to the Board true copies of the by-laws, rules and regulations adopted pursuant to this paragraph.

(d) To obtain from members of the industry, through a confidential agency, such statistical information and reports as are required for the administration of this code and to provide for submission by members of the industry of such statistical information and reports as the Board may deem necessary for the purposes recited in Sec. 3 (a) of the act, which information and reports shall be submitted by members of the industry to such governmental agencies as the Board may designate; provided, that nothing in this code shall relieve any member of the industry of any existing obligations to furnish reports to any government agency. No individual reports submitted to the Board and/or such governmental agencies as the Board may designate, shall be disclosed to any other member of the industry or any other party except to such governmental agencies as may be directed by the Board.

(e) To use such trade associations and other agencies as it deems proper for the carrying out of any of its activities provided for herein; provided, that nothing herein shall relieve the Code Authority of its duties or responsibilities under this code and that such trade associations and agencies shall at all times be subject to and comply with the provisions hereof.

(f) To make recommendations to the Board for the coördination of the administration of this code and such other codes, if any, as may be related to or affect members of the industry. On the receipt of such recommendations the Board may establish a Coördination Committee and empower the Code Authority to appoint a member or members thereof so that the industry may have equal representation on said committee with any industry operating under such other code or codes, and the Board may further designate an impartial chairman. Such a Coördination Committee shall then be empowered to make investigations pertinent to the subject matter of the recommendation and thereafter submit its findings and conclusions to the Board. A determination of such Coördination Committee, with the supporting facts, shall be forwarded immediately to the Board and shall become effective upon approval thereby. In the event such Coördination Committee fails to act or agree the matter shall be submitted to the Board for final determination.

(g) To recommend to the Board the creation of additional divisions of the industry, further trade practice provisions to govern members of the industry in their relations with each other or with other industries, and measures for industrial planning, and to call meetings of any division of the industry to consider plans for stabilization of employment and production, and conservation of natural resources; and to make recommendations thereon to the Board, such recommendations upon approval by the Board, after such notice and hearing as it may prescribe, to have the same effect as other provisions of this code.

Sec. 7.—It being found necessary in order to support the administration of this code and to maintain the standards of fair competition established hereunder and to effectuate the policy of the act, the Code Authority is authorized:

(a) To incur such reasonable obligations as are necessary and proper for the foregoing purposes, and to meet such obligations out of funds which may be raised as hereinafter provided and which shall be held in trust for the purposes of this code.

(b) To submit to the Board for its approval, subject to such notice and opportunity to be heard as it may deem necessary: (1) an itemized budget of its estimated expenses for the foregoing purposes, and (2) an equitable basis upon which the funds necessary to support such budget shall be contributed by members of the industry.

(c) After such budget and basis of contribution have been approved by the Board, to determine and obtain equitable contribution as above set forth by all members of the industry, and to that end, if necessary, to institute legal proceedings therefor in its own name.

Sec. 8.—Each member of the industry shall pay his or its equitable contribution to the expenses of the maintenance of the Code Authority, determined as hereinabove provided, and subject to rules and regulations pertaining thereto issued by the Board. Only members of the industry complying with the code and contributing to the expenses of its administration as hereinabove provided, unless duly exempted from making such contributions, shall be entitled to participate in the selection of members of the Code Authority or to receive the benefits of any of its voluntary activities or to make use of any emblem or insignia of the National Recovery Administration.

Sec. 9.—The Code Authority shall neither incur nor pay any obligation substantially in excess of the amount thereof as estimated in its approved budget, and shall in no event exceed the total amount contained in the approved budget, except upon approval of the Board; and no subsequent budget shall contain any deficiency item for expenditures in excess of prior budget estimates except those which the Board shall have so approved.

Sec. 10.—The proportionate share of each member of the industry for expenses of code administration shall be based upon the total tonnage of quicklime and hydrated lime manufactured and sold by such member of the industry during such representative period, but not less than one year, and at such fair and equitable rate per ton as the Code Authority may determine, subject to the approval of the Board.

(a) The Code Authority may designate the National Lime Assn., or any other appropriate agency, to assist it in maintaining its accounts, determining such proportionate shares and in securing the collection thereof.

(b) The applicable provisions of this Sec. 10 shall also apply to the expenses of code administration of District Control Committees, established as hereinafter provided. Each District Control Committee shall submit to the Code Authority for its approval, to be in turn submitted to the Board for its approval, subject to such notice and opportunity to be heard as it may deem necessary: (1) an itemized budget of its estimated expenses, and (2) an equitable basis upon which the funds necessary to support such budget shall be contributed by members of the industry having a plant or plants within the district.

Sec. 11.—If the Board shall determine that any action of the Code Authority or any agency thereof may be unfair or unjust or contrary to the public interest, the Board may require that such action be suspended to afford an opportunity for investigation of the merits of such action and further consideration by such Code Authority or agency pending final action which shall not be effective unless the Board approves, or unless it shall fail to disapprove after 30 days' notice to it of intention to proceed with such action in its original or modified form.

Sec. 12. *Lime-Industry Manufacturing Districts.*—The industry shall be divided into "lime-industry manufacturing districts," which districts initially established are set forth in Schedule A of this code. The Code Authority may from time to time revise such districts or any of them, sub-

ject to the approval of the District Control Committees of the districts affected, and subject to modification or approval by the Board upon review.

Sec. 13. *District Control Committees.*—All members having a plant or plants located in each district may, at a meeting called for that purpose on proper notice, at which meeting each such member shall be entitled to one vote, establish therefor, upon the majority vote of such members in attendance at such meeting, a District Control Committee to consist of such number of supporting members as the voting members shall determine, subject to the approval of the Code Authority and the Board. In order to provide, as far as practicable, and as not otherwise required by this code, for the administration of this code within each district by the members having a plant or plants located therein, the District Control Committees, in addition to the duties and powers conferred upon them elsewhere in this code, shall be charged with the power and duty of supervising the provisions of this code within their respective districts, subject to disapproval of the Code Authority and subject to modification or approval upon review by the Board.

(a) Any information required to be submitted to a District Control Committee shall be reported to a confidential agency selected by the District Control Committee, and if, in the opinion of such committee, a violation of this code is disclosed, such committee shall file such information together with a formal complaint in accordance with such plan for handling trade practice complaints as may have been approved by the Board. All activities of the District Control Committees shall be subject to the disapproval of the Code Authority. Copies of minutes of all meetings held by District Control Committees shall be filed immediately with the Code Authority and by it with the Board.

(b) Each District Control Committee shall adopt by-laws, rules and regulations of procedure for the conduct of its business under this code. Such by-laws, rules and regulations shall be subject to the approval of the Code Authority and the Board, and true copies of such by-laws, rules and regulations shall be furnished to the Code Authority and by it to the Board.

ARTICLE VII—REPORTS

Sec. 1.—In addition to such reports as may be required from time to time under the provisions of Sec. 6, Subsec. (d) of Article VI, each member of the industry shall furnish to a confidential agency of the Code Authority promptly and upon forms approved by the Code Authority, complete and accurate reports of shipments, plant capacity, and such other data pertinent to the administration of this code as the Code Authority may specify. Information pertaining to the operations of individual members of the industry shall be kept confidential at all times.

Sec. 2.—At the option of any District Control Committee such reports and statistical data may be collected and compiled by it for the district. In case any District Control Committee, or a majority of the members in any unorganized district shall require it, such reports and statistical data for that district shall be collected through a confidential agency appointed by such District Control Committee, or, in the case of an unorganized district, a confidential agency of the Code Authority. All such data shall be furnished to the Code Authority.

Sec. 3.—The confidential agency of the Code Authority shall compile such records and statistical data in accumulated totals and averages by districts and for all districts and distribute the same to all members.

ARTICLE VIII—MARKETING

Sec. 1. *Cost Finding.*—The Code Authority shall cause to be formulated methods of cost finding and accounting capable of use by all members of the industry, and shall submit such methods to the Board for review. When approved by the Board, full information concerning such methods shall be made available to all members of the industry. Thereafter, each member of the industry shall utilize such methods to the extent found practicable. Nothing herein contained shall be construed to permit the Code Authority, any agency thereof, or any member of the industry to suggest or agree to uniform additions, percentages or differentials or other uniform items of cost which are designed to bring about arbitrary uniformity of costs or prices.

Methods of Selling

[The Board reserves the right to stay or modify the multiple basing-point provisions of the following sections at any time upon notice. The Research and Planning Division of the N.R.A. and the Trade Relations Committee of the National Lime Assn. will make a study of the effect of these provisions and report to the Board on or about June 15, 1935.—EDITOR.]

Sec. 2. *Establishment of Basing Points.*—Each District Control Committee shall establish for each manufacturing plant within its district, subject to the disapproval of the Board, a basing point to govern all rail shipments. Different basing points may be established for different products. Said basing point, which may be changed or revised from time to time as conditions warrant, subject to the approval of the Board, shall be fair and reasonable to all interested parties. Nothing herein contained shall prevent any member of the industry from establishing his own plant as his basing point if he so desires; provided, however, that such member of the industry shall file his intention with his District Control Committee, and if there is no District Control Committee, then with the Code Authority, prior to such plant becoming a basing point.

(a) In the event that any district shall not have a District Control Committee, then such basing point or points shall be established for such district by the Code Authority, after first requesting the recommendation of members of the industry within such district.

(b) The District Control Committee shall also designate the low-rate area governed by each basing point, which shall include all destinations to which the basing point has the low or equal all-rail freight rate for each industry product in the same rail freight classification manufactured at those plants for which the basing point has been established. Accepted geographic lines may be used as boundaries of such low-rate areas, provided, that the District Control Committee shall provide for the use of the low basing all-rail freight rate for all destinations. Any District Control Committee may, for any designated product manufactured within the district, establish for any plant a basing point already established by some other District Control Committee if the low-rate area of such basing point is partly within the boundaries of the district designating such basing point. For the purposes of this code, the District Control Committee of District 5-A (as set forth in Schedule A of this code) shall select a basing point for Ohio finishing hydrated lime produced in said District 5-A, and the entire United States shall become the "low-rate area" for that selected basing point.

Sec. 3. *Price Publication.*—Each member of the industry shall, not later than 10 days after the effective date of this code, file as provided hereafter in Subsec. (d) of this Sec. 3, with a confidential and disinterested agency of the District Control Committee for the district in which the manufacturing plant is located, or if none, then with a confidential and distinterested agency of the Code Authority, identified lists of all of his prices, discounts, terms and conditions of sale, hereinafter referred to as "price terms," for each of the industry products manufactured and offered for sale, which price terms shall become effective at the expiration of such 10-day period and shall so file all subsequent changes therein or revisions thereof which shall become effective as hereinafter provided. All such lists shall completely and accurately conform to and represent the individual pricing practices of said member and shall contain the price terms for all such standard products of the industry as are manufactured and offered for sale by said member and for such non-standard products of said member as shall be designated by the District Control Committee and/or the Code Authority. Changes in or revisions of price terms shall become effective at 12:00-M midnight of the fifth day following the receipt thereof by said agency; provided that any member of the industry may file his price terms to meet those filed by another member of the industry to take effect on the effective date of the price terms so to be met; and provided further, that if a member of the industry desiring to meet the price terms of another, is unable to do so by reason of failure to receive notice of such filing prior to the effective date of such revised price terms, he may, nevertheless, file his own price terms within 48 hr. after receiving notice of the filing of the price terms to be met, in which case his price terms will become effective on filing.

(a) Immediately upon receipt thereof said agency shall, by telegraph or other equally prompt means, notify said manufacturer of the time of such receipt. Such lists and revisions, together with the effective time thereof, shall upon receipt be immediately and simultaneously distributed to the members within the district interested therein and to the Code Authority. Immediate and simultaneous distribution shall also be made to any other member of the industry interested therein, and to all customers who have applied therefor in writing and have agreed to defray the cost actually incurred by the designated agency in the preparation and distribution thereof. Copies shall be available at the office of such agency for inspection by customers of any member of the industry. Such lists and revisions, or any part thereof, shall not be made available to any person until released to those designated above as entitled to receive the same.

(b) The Code Authority shall maintain a permanent file of all price terms filed as herein provided, and shall not destroy any part of such records, except upon written consent of the Board. Upon request the Code Authority shall furnish to the Board or any duly designated representative of the Board copies of any such lists or revisions of price terms.

(c) When any member of the industry has filed any revision, such member shall not file a higher price within 48 hr.

(d) Price terms shall be filed f.o.b. rail basing point for the low-rate area in which the member's plant is located. Such price terms shall include all industry products manufactured at and offered for sale from such plant, and shall designate any destinations or areas beyond the low-rate area in which the manufacturing plant is located to be governed by such price terms. The delivered price terms of each such industry product for rail delivery within such low-rate area and to the designated destinations or areas beyond such low-rate area shall be the sum of the price or prices filed f.o.b. basing point plus the rail freight rate from basing point to destination. For areas and destinations not included in the price terms so filed any member of the industry wishing to meet the competition of any other member of the industry may do so, except as provided in Subsec. (f) of this Sec. 3, by filing the following statement, which shall be considered the filed price terms for any destination or area not included in the price terms filed for the basing point:

"Delivered price terms to destinations or areas not covered by the price terms filed for the basing point shall not be more favorable to the purchaser than the most favorable price terms published by other members of the industry for the same destination or area for like industry products of similar grade and quality."

(e) Price terms shall also be filed for any shipments from manufacturing plants by truck or water, and/or any "mill pickups," such price terms to specify: (1) the area in which any truck or water shipments will be made, (2) the trucking or water transportation charge or rate, and (3) the minimum quantity to be shipped by truck or water; provided, nothing herein contained shall prevent any member of the industry from meeting truck or water prices filed for like industry products of similar grade and quality, and provided further, that the member of industry meeting such filed prices shall file his own prices on like industry products of similar grade and quality in accordance with all the provisions for filing as provided for in this Article VIII, and specifically as provided for in this Subsec. (e) of this Sec. 3 of this Article VIII.

(f) The net realized plant price for any industry product which is sold for delivery in any area or destination to meet competitive price terms of another member of the industry as provided in Subsec. (d) above, must not be less than 80 per cent. of the filed price for that product f.o.b. basing point. [Operation of this paragraph is stayed for 90 days from effective date.—EDITOR.]

(g) In order to insure that this provision will not work a hardship on any member of the industry, or the customers of the industry, in any given locality, any member of the industry may petition the Code Authority for relief by exemption or modification of this limitation as it applies to his sales. Upon receipt of such petition the Code Authority shall fix a date for the hearing of same within 15 days. At the same time the Code Author-

ity shall notify the District Control Committees of all production districts whose manufacturers ship to destinations named in the petition, as well as the District Control Committee in whose low-rate area destinations are located, inclosing copies of the petition and affording the opportunity for those committees and their witnesses to be heard at said hearing. Based upon the evidence submitted, the Code Authority shall render a decision within 10 days from date of hearing, submitting same, together with all pertinent testimony and facts, to the Board for its consideration. If, within 30 days after submission to the Board, such decision shall not be disapproved by the Board, the Code Authority shall advise all interested parties of the decision, which shall be final and binding upon all members of the industry, subject to the disapproval of or modification by the Board at any time. [Operation of this paragraph is stayed for 90 days from effective date.—EDITOR.]

Sec. 4. No member of the industry shall sell, or offer to sell, industry products for which price terms have been filed pursuant to the provisions of this Article VIII, at variance with such price terms then in effect, except as otherwise provided in this code.

Sec. 5. No member of the industry shall enter into any agreement, understanding, combination or conspiracy to fix or maintain price terms, nor cause or attempt to cause any member of the industry to change his price terms by the use of intimidation, coercion, or any other influence inconsistent with the maintenance of the free and open market which it is the purpose of this Article VIII to create.

Sec. 6.—Nothing hereinabove contained shall prevent any member of the industry from deviating from his filed price terms in order to meet the competitive price terms of members of the industry shipping from plants producing like industry products of similar grade and quality located in other low-rate areas for destinations in the low-rate area in which his plant is located; provided, however, that said member shall file with his District Control Committee immediately and before quotation is made, the destination or destinations involved, and the name and delivered price terms of the competitor whose price terms are to be met.

Sec. 7.—It shall be an unfair method of competition for any member of the industry to file price terms not as a *bona fide* expression of business policy but merely for the purpose, or with the effect, of discriminating between different purchasers of a product of similar grade and quality, or to deviate from any of the provisions of this Article VIII.

Merchandising Plans

Sec. 8. Each District Control Committee may prepare a uniform merchandising plan and/or system of standardization of products, containing such provisions as may be deemed necessary or proper to insure fair selling methods and to prevent unfair competitive practices by the members of industry selling within the low-rate areas of the district. When such plans and/or systems have been so prepared for the low rate areas of any district they shall be submitted for approval to all supporting members in that district.

(a) When approved by supporting members who, in the preceding calendar year produced at least 60 per cent. of the total district tonnage produced in that year, such plans and/or systems shall be sent to the Code Authority for review and approval.

(b) Upon approval by the Code Authority, subject to approval upon review by the Board, with which copies of all such plans and/or systems shall be filed immediately, it shall be an unfair method of competition for any member of the industry to quote or sell industry products for delivery at any destination within the low-rate areas of the district for which such plans and/or systems have been approved, except in accordance with the provisions thereof.

[Operation of this entire section is stayed 90 days from the effective date.—EDITOR.]

Sec. 9. *Standard Forms.*—Each District Control Committee, in coöperation with the Code Authority, shall prepare immediately standard forms for quotations and contracts for use by all members of the industry producing in the district, which forms shall specify the terms and conditions under which quotations and contracts for sale shall be made. When so prepared and approved by the District Control Committee such forms shall be sent to the Code Authority for review and approval.

(a) Upon approval by the Code Authority, subject to approval upon review by the Board, with which copies of all such forms shall be filed immediately, it shall be an unfair method of competition for any member of the industry to quote or sell industry products for delivery at any destination within the low rate areas of the district for which such forms have been approved, on terms and conditions at variance with those specified in such approved forms.

[Operation of this entire section is stayed 90 days from the effective date.—EDITOR.]

Sec. 10. *Standards of Fair Competition for Pricing.*—The standards of fair competition for the industry with reference to pricing practices are declared to be as follows:

(a) *Costs and Price-Cutting.*—Wilfully destructive price-cutting is an unfair method of competition and is forbidden. Any member of the industry or of any other industry, or the customers of either, may at any time complain to the Code Authority that any filed price constitutes unfair competition as destructive price-cutting, imperiling any enterprise, large or small, or tending toward monopoly or the impairment of code wages and working conditions. The Code Authority shall, within 5 days, afford an opportunity to the member filing the price to answer such complaint and shall, within 14 days, make a ruling or adjustment thereon. If such ruling is not concurred in by either party to the complaint, all papers shall be referred to the Research and Planning Division of N.R.A. which shall render a report and recommendation thereon to the Board.

(b) When no declared emergency exists as to any given product, there is to be no fixed minimum basis for prices. It is intended that sound cost estimating methods should be used and that consideration should be given to costs in the determination of pricing policies.

(c) When an emergency exists as to any given product, sale below the stated minimum price of such product, in violation of Sec. 11 and Subsec. (a) of Sec. 11 hereof is forbidden.

Sec. 11. *Emergency Provisions.*—If the Board, after investigation, shall at any time find both: (1) that an emergency has arisen within any designated area adversely affecting any enterprise, large or small, or wages or labor conditions, or tending toward monopoly or other acute conditions which tend to defeat the purposes of the act, and (2) that the determination of the stated minimum price for a specified product within such designated area for a limited period is necessary to mitigate the conditions constituting such emergency and to effectuate the purposes of the act, the Code Authority may cause an impartial agency to investigate costs and to recommend to the Board a determination of the stated minimum price of the product affected by the emergency and thereupon the Board may proceed to determine such stated minimum price.

(a) When the Board shall have determined such stated minimum price for a specified product for a stated period in such specified area, which price shall be reasonably calculated to mitigate the conditions of such emergency and to effectuate the purposes of the act, it shall publish such price. Thereafter, during such stated period, no member of the industry shall sell such specified products in such specified area at a net realized price below said stated minimum price and any such sale shall be deemed destructive price-cutting. From time to time the Code Authority may recommend review or reconsideration, or the Board may cause any determination hereunder to be reviewed or reconsidered and appropriate action taken.

ARTICLE IX—TRADE PRACTICE RULES

Sec. 1.—The following trade practices are specifically declared to constitute unfair methods of competition between members of the industry, and no member of the industry shall use or engage in any of them, either directly or indirectly, through any officer, agent or employee. Engaging in any one or more of these or any further trade practice provisions which hereafter may be established on recommendation by the Code Authority, approved by the Board, after such hearings as it may prescribe, shall be deemed to be in violation of this code.

Sec. 2. *Departure from Agreed Working Conditions.*—The paying of lower than the minimum wages herein prescribed, or the exaction of hours of labor in excess of the maximum herein prescribed without complying with the overtime requirements.

Sec. 3. *Commercial Bribery.*—No member of the industry shall give, permit to be given, or offer to give anything of value for the purpose of influencing or rewarding the action of any employee, agent or representative of another in relation to the business of the employer of such employee, the principal of such agent or the represented party, without the knowledge of such employer, principal or party. This provision shall not be construed to prohibit free and general distribution of articles commonly used for advertising except so far as such articles are actually used for commercial bribery as hereinabove defined.

Sec. 4. *Rebates, Subsidies, etc.*—To make secret allowances, such as bonuses, rebates, refunds, credits, unearned discounts, or subsidies of any kind, whether in the form of money, services, advertising, or otherwise for the purpose of influencing the sale of industry products.

Sec. 5. *Lump-Sum Bids and Contracts.*—To submit a bid or bids for two or more commodities, at least one of which is an industry product, in which the unit price of each commodity is not clearly stated. Accepting orders or contracts for sale at a lump sum where the contract does not specify the exact quantity, quality, and unit price of the product.

Sec. 6. *Combination Sales.*—No member of the industry shall sell or offer to sell any commodity, except in accordance with his current price list for that commodity, or, if the commodity in question is not an industry product then at less than the *bona fide* invoice price, plus all transportation costs, if any, for such commodity for the purpose or having the effect of influencing or inducing the sale of industry products and thereby creating an unfair price advantage for a member of the industry.

Sec. 7. *Inducing Breach of Contract.*—Knowingly inducing or in any manner attempting to induce the breach of any existing sales order or of any existing contract between a competitor and his customer or source of supply; or interfering with or obstructing in any manner the performance of the contractual duties or services between a member of industry and his customer.

Sec. 8. *Defamation of Competitors.*—To defame or disparage a competitor directly or indirectly by words or acts which unfairly raise a question as to his business integrity, his ability to perform his contracts, his credit standing, or the quality of his product.

Sec. 9. *Limitation on Sales of Quicklime in Bulk.*—The sale by any member of the industry to any purchaser of quicklime in bulk which he knows is for purposes of resale as packaged quicklime.

Sec. 10. *Misrepresentation.*—To sell or offer for sale industry products for the purpose or with the effect of deceiving customers or prospective customers as to the quantity, quality, or grade of such products.

Sec. 11. *False Branding.* — Marking, branding, and labeling industry products and making statements regarding industry products, the purpose or effect of which may be to mislead or deceive purchasers as to the quantity, quality, grade or substance of such products purchased.

Sec. 12. *Imitation of Trade Marks.*—To imitate or to simulate the trade mark, trade name, package, brand or label of a competitor in such degree as to deceive, or have a tendency to deceive customers.

Sec. 13. *Consigned Goods.* — Shipping goods on consignment, except under circumstances to be defined by the Code Authority, and approved by the Board, when peculiar circumstances of the industry require that practice.

Sec. 14. *Transactions with Jobbers, Agents and Dealers.*—A builders' supply dealer or an agricultural dealer shall not in any case be classified as an agent for chemical, industrial, or agricultural lime, or as a jobber for building lime in the trading area in which he operates as a retail dealer, unless approved by the District Control Committees involved. [Operation of this section is stayed pending determination of policy by the Board.—EDITOR.]

Sec. 15.—Purchases of industry products by a jobber (as defined in Article II, Sec. 11) for his own use or for resale from his own retail yard, shall be on the dealer price basis. [Operation of this section is stayed pending determination of policy by the Board.—EDITOR.]

Sec. 16. *Shipments Without Orders.*—To make shipments without having a *bona fide* order from the customer at the time the shipment is made.

Sec. 17. *Contracts.*—All *bona fide* contracts and/or orders for shipments for specific jobs and/or period requirements may be shipped at the price specified in the contract and/or order, regardless of any subsequent price increase, and any industry product so shipped must be applied only on such contract and/or order.

(a) In the event of any advance in the price or prices or a sale at less than a listed price of industry products by a member of the industry, such member shall, within 30 days, file with a confidential and disinterested agency of his District Control Committee a list of all uncompleted contracts and/or orders made or entered into prior to the price increase, giving the name of customer, total tonnage required, price and expiration date; and, in the case of specific building job contracts, the name of the job, its location, the dealer, the contractor, unshipped tonnage, and price, with a certification from the dealer that he has a *bona fide* contract with the contractor and/or owner covering such products, and shall report to such agency of his District Control Committee all shipments made on any such contracts and/or orders as and when the same are made and also shall report completion, cancellation, or modification thereof, and may report information concerning any other member's listed contracts and/or orders.

(b) All contracts made within 30 days (except government jobs made to meet requirements of proposals or applicable law) after any price increase but based upon a quotation made prior thereto may be shipped at the contract price regardless of any price increase, provided that on all such jobs the contract and/or contracts involving industry products has been awarded prior to the expiration of the 30-day period following the date of price increase, all such contracts must be filed with such agency of the District Control Committee in the manner aforesaid within 15 days after said 30-day period (or such other period stipulated by governmental proposals or applicable law). Such agency of the District Control Committee shall promptly disseminate to members of the industry concerned all information pertaining to such specific building-job contracts and/or orders, and in the case of other contracts, information regarding the validity of any specific contract or commitment so filed shall be given to any member of the industry upon request.

Sec. 18. *Duration of Contracts.*—Except where otherwise necessary to meet governmental bid requirements, no member of the industry shall make any quotation for a period in excess of 15 days from date of quotation; provided, however, that any such quotation may be specifically renewed for a like period upon request of the prospective purchaser.

(a) Chemical Lime.—No member of the industry shall contract or agree to furnish chemical lime to any purchaser for more than a calendar quarter-annual period; nor shall he make any quotation, contract, or agreement for the sale of lime for any such calendar quarter-annual period, prior to the first day of the last month of the immediately preceding calender quarter-annual period.

(b) Building Lime.—In instances where building lime is sold for specific jobs in lieu of making specific job contracts with dealers and processors, a purchase order at the prevailing price will be considered as a sufficient binding contract with the provision that if the price advances at any time, a specific job contract will be written within 30 days after the price advance at the price prevailing at the date of the purchase order for the amount of lime still required. Specific job contracts must be supported by the dealer's original order and record of prior deliveries, if any, and the contractor's written estimate of the balance required for completion. Where no specific job contract is made within 30 days after the price advance, then such jobs must take the advanced price.

(c) Agricultural Lime.—No member of the industry shall contract or agree to furnish agricultural lime to any purchaser for more than a calendar semi-annual period, nor shall he make any quotation, contract, or agreement for the sale of such product for any such calendar semi-annual period prior to the first day of the month immediately preceding such calendar semi-annual period.

(d) Government Purchases (Federal, State, County, Municipal and/or Political Subdivisions).—Each bid shall specify that it shall be void if award shall not be made and contract executed within 30 days after date of the opening of bids; and only calendar quarterly contract shall be accepted, unless otherwise specified in the proposal or by applicable law, but in no case for any period longer than one year.

Sec. 19. *False Classification.*—The classification of industry products for the purpose of determining freight charges thereon, different from the classification adopted by the industry and accepted by the rail carriers, to secure a lower freight rate.

Sec. 20. *Substitution.*—Substitution of any industry product superior in quality or grade for the purpose of furnishing such product at prices lower than would otherwise prevail.

Sec. 21. *Contingent Sales.*—The purchase of materials or service from a buyer of industry products, made contingent upon the sale of industry products by a member of the industry, or the sale of industry products by a member of the industry made contingent upon the purchase of materials or service.

Sec. 22. *Splitting of Commissions.*—To permit the splitting of commissions or other compensation received by an employee or agent of the seller, with the buyer for the purpose or with the effect of influencing a sale of industry products.

Article X—Modification

Sec. 1.—This code and all the provisions thereof are expressly made subject to the right of the President, in accordance with the provision of sub-section (b) of Sec. 10 of the act, from time to time to cancel or modify any order, approval, license, rule, or regulation issued under Title I of said act and specifically, but without limitation, to the right of the President to cancel or modify his approval of this code or any conditions imposed by him upon his approval thereof.

Sec. 2.—Such of the provisions of this code as are not required to be included therein by the act, may, with the consent of the industry and the approval of the Board, be amended as provided in Sec. 3 hereof, in such manner as may be indicated by the needs of the public, by changes in circumstances, or by experience. All the provisions of the code, unless so modified or eliminated, shall remain in effect until the expiration date of Title I of the Act.

Sec. 3.—An amendment may be proposed by any interested party either to the Code Authority or directly by or to the Board. All proposed amendments shall be referred to the Code Authority, which shall give members of [the] industry an opportunity to be heard thereon, and thereafter the Code Authority may make such recommendations thereon as is deemed proper. When approved by the Board as necessary to effectuate the policies of the act, after such notice and hearing as it may prescribe, any proposed amendment shall thereupon become effective as a part of this code.

Sec. 4.—If the Code Authority shall desire to propose an amendment, after having approved the same, it shall submit the same to the members of the industry who shall thereupon vote upon said proposed amendment either at a special meeting called for that purpose or by mail ballot, at the discretion of the Code Authority. Upon the approval of the majority of the members of the industry so voting the Code Authority shall then submit the proposed amendment to the Board.

Article XI—Monopolies

No provision of this code shall be so applied as to promote monopolies or monopolistic practices, or to eliminate, oppress or discriminate against small enterprises.

Article XII—Effective Date

This code as amended shall become effective on the tenth day after the date of its approval by the Board and shall then supersede the Code of Fair Competition for the lime industry approved by the President October 3, 1933.

Schedule A—Lime Industry Manufacturing Districts

District 1: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and that portion of New York east of the 77th meridian.

District 2: Delaware, District of Columbia, Maryland, New Jersey, and that portion of Pennsylvania east of the 77th meridian.

District 3: West Virginia and that portion of New York and Pennsylvania west of the 77th meridian.

District 4: North Carolina, South Carolina, Virginia.

District 5a: The Ohio hydrated finishing-lime plants and factories located in the State of Ohio; Herzog Lime & Stone Co., Forest, O.; Gibsonburg Lime Products Co., Gibsonburg, O.; Kelley Island Lime & Transport Co., White Rock, Gibsonburg and Tiffin, O.; National Gypsum Co., Luckey, O.; National Lime & Stone Co., Carey, O.; National Mortar & Supply Co., Gibsonburg, O.; Ohio Hydrate & Supply Co., Woodville, O.; United States Gypsum Co., Genoa, O.; Washington Building Lime Co., Woodville, O.; Woodville Lime Products Co., Woodville, O.

District 5b: State of Ohio, except the hydrated finishing-lime plants described in District 5a above.

District 6: Michigan.

District 7: Illinois, Indiana and that portion of Missouri east of the 93rd meridian.

District 8: Wisconsin.

District 9: Iowa, Nebraska, North Dakota and South Dakota.

Districts 10 and 11: Alabama, Florida, Georgia, Kentucky, Louisiana east of the Mississippi River, Mississippi, Tennessee.

District 12: Arkansas, Kansas, Louisiana west of the Mississippi River, Nebraska, Oklahoma and that portion of Missouri west of the 93rd meridian.

District 13: Texas.

District 14: Idaho, Montana, Oregon, Washington, Wyoming.

District 15: Arizona, California, Colorado, Nevada, New Mexico, Utah.

Schedule B—Dolomite Division of the Code of Fair Competition for the Lime Industry

Article I

To effectuate the policies of Title I of the National Industrial Recovery Act, and to make specifically applicable the provisions of the Code of Fair Competition for the lime industry this Schedule B is hereby established as a Code of Fair Competition for the Dolomite Division of the lime industry. All the provisions of the Code of Fair Competition for the lime industry are incorporated herein by reference and shall be binding upon every member of the industry, except those provisions which are inconsistent and inapplicable to the Industry Products of the Dolomite Division.

Article II—Definitions

Sec. 1.—In addition to the definitions contained in Article II of the Code of Fair Competition for the lime industry, the terms enumerated in this Article II shall have the meanings herein defined wherever used in this Schedule B or in any supplement appertaining thereto.

Sec. 2.—The term "dolomite division" includes the manufacture and/or original sale of industry products by a member of the industry either by himself or by his agent, which includes without limitation any person or corporation occupying a subsidiary or controlling relationship or one of common, mutual or joint ownership or control to a member of the industry.

Sec. 3.—The term "industry products" includes dolomitic lime for refractory purposes irrespective of the extent of burning or other refinements.

Sec. 4.—The term "member of the industry" includes but without limitation, any individual, partnership, association, corporation or other form of enterprise engaged in the industry, either as an employer or on his or its own behalf.

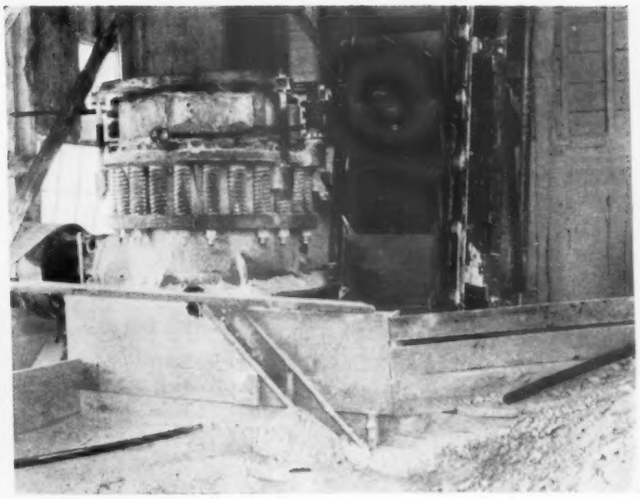
Sec. 5.—Wherever used in the provisions hereinafter incorporated in this code by reference, the term "Code Authority" means that body constituted hereinafter by Article III.

Article III—Organization, Powers and Duties of the Code Authority

Sec. 1.—*Organization and Constitution.*—A Code Authority is hereby constituted to administer the provisions of this Schedule B and shall consist of not more than 9 voting members. Each of such voting members shall be a representative of a member of the industry of this dolomite division.

(a) In addition to the above membership the National Industrial Recovery Board may appoint 3 members without vote and without compensation from the industry otherwise to act as members of the Code Authority for such terms as it may specify. For the purposes of this code such members as have been appointed on the National Code Authority for the lime industry shall serve as such members on the Code Authority for the dolomite division.

The crushed-stone plant viewed from the quarry. Locomotive in foreground hauls cars to foot of incline to plant.



The 3-ft. cone reduction crusher with elevator which also handles primary-crusher product.

Progressive Improvement Program Keeps Small Stone Plant Up-To-Date

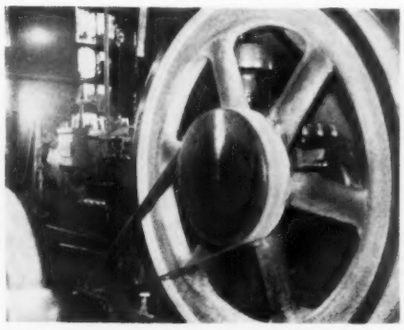
Triple-Deck Vibrating Screen Is Used for Both Scalping and Sizing

THE crushed-stone plant of the Union Quarries Co., Van Wert, O., is an example of the effect of progressive improvements on a small plant. The present plant was built in 1923, but the quarry history dates back about 50 yr. The series of improvements included the installation of a Telsmith crusher in 1929, a Symons 3-ft. cone crusher in 1930 and a Niagara vibrating screen and a Webster bucket-elevator in 1934. The present plant capacity is 40 tons per hr.

The plant is located about 9 mi. west of Van Wert and has no railway connection, all the shipments being made by motor trucks. The deposit is a medium-hard limestone with a class A-1 rating similar to other stone in that section of the state. The overburden ranges from 2 to 6 ft. in depth and is removed during slack seasons with the quarry shovel. Blast holes are drilled by a Loomis Clipper gasoline-operated well drill using a 6-in. bit. Ingersoll-Rand Jackhamers are used for secondary drilling. A Marion 1-cu.yd. steam shovel loads the material into 1½-cu.yd. cars which are hauled in trains of three to the plant incline by a 4-ton Plymouth locomotive powered by a Continental gasoline engine.

An Allis-Chalmers hoist hauls the cars up the incline one at a time and the stone is dumped into the Telsmith 16A gyratory primary crusher. This reduces it to 3-in. minus and feeds it to the Webster super-capacity bucket-elevator which has 24-in. by 16-in. by 12-in. buckets and operates on centers 65½ ft. apart. This elevator, which has a rated capacity of 300 tons per hr., discharges the stone on the 4-ft. by 14-ft. Niagara triple-deck vibrating screen. When producing road stone, which is most in demand, ¾-, ½- and ¼-in. openings are used on this screen. The ¾-in. plus material retained on the top deck is chuted to the Symons 3-ft. cone crusher for further reduction. The recrushed mate-

Another view of plant with well drill and shovel in foreground.



The 125-hp. semi-Diesel engine which operates the entire plant.

The triple-deck screen which serves as a scalping and sizing unit.

rial is returned to the elevator in closed-circuit. The four sizes separated by the screen, including screenings and dust, are chuted to bins which have a combined capacity of 700 tons and from which the trucks are loaded.

All shipments are weighed on a Fairbanks-Morse 20-ton truck scale. Considerable material is kept stored in stock-piles at all times and this is reloaded into trucks by a Barber-Greene 42A stock-pile loader driven with a Buda gasoline engine.

The entire plant is operated through flat belts and line-shafts driven by a 125-hp. Buckeye semi-Diesel engine. This engine, and the quarry shovel and locomotive are the only pieces of equipment remaining from the original plant and have been in almost constant use since 1923. A 20-hp. Fairbanks-Morse semi-Diesel engine drives a Curtis 2-cyl. air-compressor and a Fairbanks-Morse 15-kw., 115-v. generator for lights. The large engine also drives a cooling-water pump, a power saw-drill, forge, etc.

Bonneville Plant (from page 27)

graphic recorder gives a record of the weight of each material in every batch, as well as the consistency of the concrete mixed from each batch. The time of all events is also recorded. This gives a permanent record of the number of yards of concrete, its consistency or slump, and the material in the concrete. This record is on one sheet of paper, giving exact, coördinated records.

The batches, except water, are discharged into a collecting cone and are sent by an air-operated swivel chute to one or the other of the mixers. Water passes through a separate pipe, a separate part of the swivel chute and on to the mixers, the water and aggregates coming together first in the mixers. The discharge is arranged in proper sequence, preventing balling or clogging in the mixers and further providing some mixing in the chutes and collecting cone.

The mixing-plant operator on the batching floor is in full view of the cement, water and sand batchers, the recorder, and the consistency indicators. Through the windows in the floor he sees the mixers. Through a window at one side he sees the concrete train and the loading platform of the "hi-line." He controls and dumps the mixers, and he operates the swivel chute, directing the material to the desired mixer. He discharges the batchers, which fill automatically after they are closed. He has at hand the lever to select which class of concrete is to be mixed. The batch meters are set automatically when the mixer is charged. There are interlocks in the control station which provide against short mixing, double mixes, charging a mixer not yet dumped, and charging a mixer when it is not in a position to be charged. Lights indicate when each operation is finished, and when the next operation may be started.

Operation of the mixing plant calls for one operator for the entire plant, and a maintenance man when needed. The batchers can take care of a 1¼-min. mixing time, or charge a mixer every 35 sec. This allows using three mixers later, if necessary. While only one-man operation of so large a plant is unusual, it is quite practical as the developments and experience on several of the large projects of recent years show. The pendulum type scales are of Kron manufacture and the two batch meters were furnished by the Koehring Co. of Milwaukee.

The two 3-cu.yd. Norris K. Davis mixers are tilted to discharge directly into a double dump car having two 3-cu.yd. hoppers. This car, also manufactured by the Norris K. Davis Co., operates on a standard-gage shuttle track 250 ft. long to a loading platform immediately above the site of the power-house substructure. The car is provided with a St. Paul hydraulic hoist operated by a Westinghouse 10-hp. constant-speed motor, and is drawn by a Plymouth Type 6 Model DLC locomotive.

At the loading platform the car dumps directly into a 6-cu.yd. bucket, which empties into the forms. The bucket is carried by a cableway which spans the power-house site. This cableway leads from an A-frame head-tower 145 ft. high to two 75-ft. movable tail-towers mounted on trucks operating on a radial track on the hillside above the locks. The runway is 600 ft. long and the cable span 1,390 ft. Roebling and Leschen track cables are used.

Concrete for the upper and lower ends of the locks and part of the power-house wall, which can not be handled by the cableway, will be laid with a Chain-Belt "Rex" Pumpcrete unit to be installed at the loading dock of the cableway. All the concrete is, of course, made under strict government supervision. In placing it internal vibration is produced by means of Viber machines. One of the haulage units used on this job is a 35-cu.yd. trailer hauled by a Mack truck, the entire unit being on 26 tires.

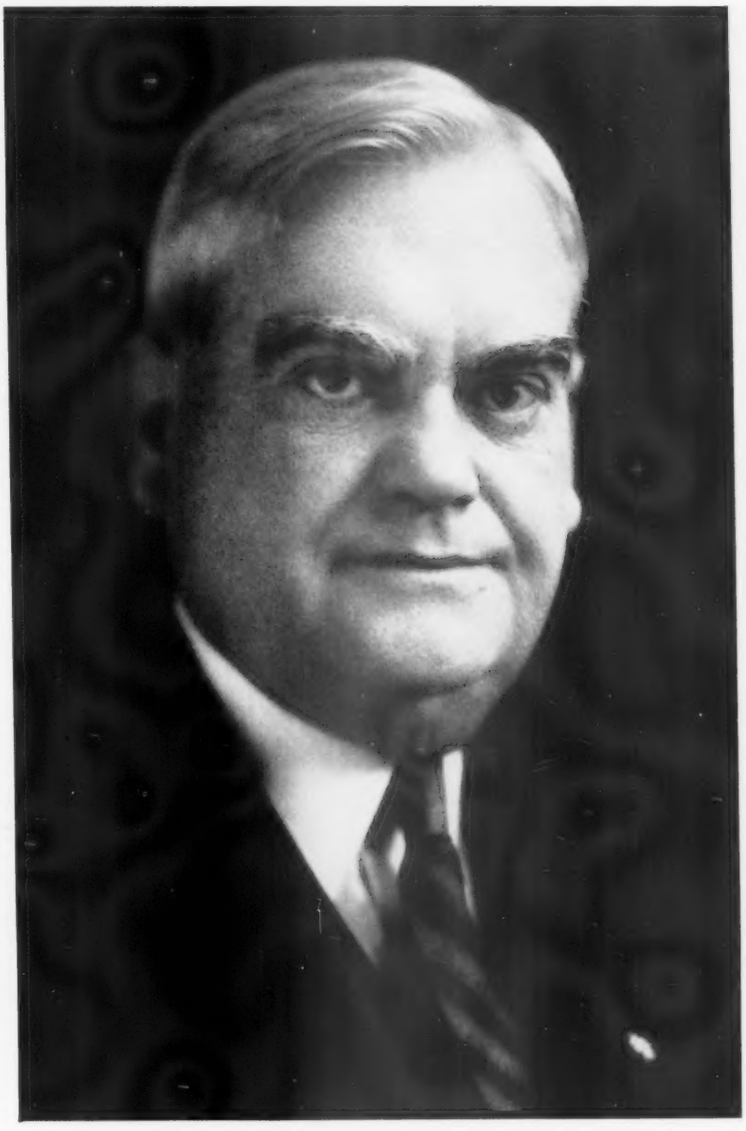
National Cement (from page 52)

Portland Cement Co., and the plant of the Keystone Portland Cement Co., at Bath, Pa.

William B. Richardson, president of the company, is also president of the Philadelphia Export Co. and vice-president and treasurer of the Washington Baseball Club of the American League. John D. Shibe, treasurer of the company, is vice-president of the Philadelphia Athletics of the American League and secretary-treasurer of the Philadelphia Export Co. George Richardson, secretary, is general manager and treasurer of the Merchant's Warehouse Co., Philadelphia, and the Philadelphia Tidewater Terminal, and treasurer of Scott Bros., Inc., Philadelphia. Hugh J. Larkin, assistant vice-president and general manager, is secretary-treasurer of the South Bethlehem Brewing Co.

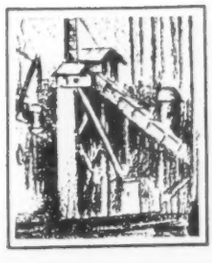
The directors of the company include, in addition to these officers: Thomas Cunningham, Philadelphia; Joseph L. Scott, Philadelphia; L. Elwood Dize, Crisfield, Md.; Arthur P. Houser, Emaus, Pa.; Stephen Williams, New York; Gunnar Larsen, New York; Torkild Stig-Nielsen, New York.

MEN OF THE INDUSTRY



A. C. BUTTERWORTH

A. C. BUTTERWORTH is president of the General Material Co., St. Louis, Mo., which was formed in 1925 to produce sand and gravel and deal in building materials. In 1927 the company started its first ready-mixed-concrete plant and is now one of the largest producers in this industry. Mr. Butterworth is also president of the Concrete Materials Co., Saugus, Mass., producer of crushed stone and sand and gravel. He was formerly president of the Southern Sand Co., Little Rock, Ark., and the Allen Gravel Co., Memphis, Tenn. Prior to 1925 Mr. Butterworth was prominent in railroad engineering and contracting. He is a member of the American Railway Engineering Assn. and the American Association of Engineers and associate member of the American Society of Civil Engineers.



Personal Mention

Herbert J. Russell is this spring celebrating his forty-first anniversary with the Jointa Lime Company, Glens Falls, N. Y., of which he is now treasurer and general manager. Mr. Russell entered the company as an accountant April 1, 1894. He is also president and general manager of the F. W. Wait Lime Co., Glens Falls.

B. F. Morris, former president of the Pioneer Sand & Gravel Co., Seattle, Wash., and later with George Scofield & Co., has been named general manager of Galbraith & Co., Seattle building material concern.

R. F. Black has been elected president of the White Motor Co., Cleveland, O., succeeding **Ashton G. Baer,** who is now chairman of the board. Mr. Black formerly was with Mack Trucks and succeeded G. A. Brockway, now chairman, to the position of president of the Brockway Motor Truck Corp.

No change was made in other offices of the White company.

R. F. Black

A. W. Robinson, cement-plant engineer of Oliver United Filters, Inc., has gone to the Argentine to superintend the installation and starting up of American cement-slurry filters at the plant of the Cia Sudamericana de Cemento Portland, (Juan Minetti y Hijos & Co.), Cordoba, Argentina.

B. L. Boye, head of the Socony-Vacuum asphalt and fuel department, was elected president at the recent annual meeting of the Asphalt Institute.

R. Y. MacIntyre, representative for the Link-Belt Co. at Memphis, Tenn., since 1932, has been transferred to the company's office at Dallas, Texas, where he will be assistant to **E. G. Wendell,** the local manager.

G. S. Brown, president of the Alpha Portland Cement Co., Easton, Pa., on April 18 was elected to the newly created position of chairman of the board of directors of the company. He resigned his position as president to take over his new duties. **F. G. McKelvy,** formerly executive vice-president of the company, was elected president to succeed Mr. Brown.

Harry H. Raber has been appointed assistant to the general manager of the New York Belting & Packing Co., Passaic, N. J.

John V. Lanahan has joined the sales organization of the New York Belting & Packing Co., Passaic, N. J., and has been assigned a territory comprised of Michigan, Indiana, Illinois, Iowa, Southern Ohio, Southern Wisconsin and Eastern Missouri.

H. S. Brightly, secretary and director of the Building Stone Assn. of Indiana, will be stationed in Washington, D. C., to promote the use of Indiana stone in building projects.

Brockwell Statter, former Northwest District sales manager of the Pacific Portland Cement Co., San Francisco, Calif., and who has been with the company for twenty-four years, has been promoted to sales manager of the Cement division with headquarters in San Francisco. **Charles J. Lair,** who has been with the company eighteen years, will assume the duties of the Northwest sales manager.

Oliver F. Reddy has joined the research department of the Patterson Foundry & Machine Co., East Liverpool, O. He will cooperate in research work in connection with mixing, agitating, grinding and other problems and in the development of new or modified equipment for the process industries.

Obituary

Charles Summers, 40, was killed on April 3, 1935, at the Superior Cement Co. plant at Superior, O.

Harold Morang, 40, a quarryman, was killed on April 8, 1935, by a rock slide at the Knox Lime Co., at Union, Me.

Edgar F. Price, 63, outstanding chemical engineer and retired president of the Union Carbide and Carbon Corp., died April 15 at his home in Port Chester, N. Y.

Llewellyn William Owens, 69, for 23 years superintendent of the John D. Owens & Sons quarry at Owens, died April 8 at his home in Marion, O.

James Garney, 33, was asphyxiated April 14 when he entered the ship, Gypsum Empress, which was being fumigated with poisonous hydrocyanic gas while at dock at Staten Island, N. Y.

Coming Events

May 16, 1935, Watertown, Wis.—Eighth Annual Rock River Valley Safety Conference.

May 17-18, 1935, Urbana, Ill.—Conference of the Mineral Industries of the State of Illinois.

June 17-20, 1935, Buxton, Derbyshire, England—Seventeenth Annual Conference of the Institute of Quarrying in combination with a World Congress of the quarrying industries.

June 17, 1935, Hot Springs, Va.—Meeting of the Code Authority of the Lime Industry, Homestead Hotel.

June 18, 1935, Hot Springs, Va.—Meeting of the Board of Directors of the National Lime Assn., Homestead Hotel.

June 19-20, 1935, Hot Springs, Va.—Seventeenth Annual Convention of the National Lime Assn., Homestead Hotel.

June 24-28, 1935, Detroit, Mich.—Annual convention, American Society for Testing Materials, Book-Cadillac Hotel.

CORRESPONDENCE

REDUCING DUST

To the Editor:

I wish to congratulate you on the common sense and inclusive way in which you have treated the subject of silicosis in the editorial in March, 1935, issue of Pit and Quarry.

It strikes me that our industrial leaders are missing a definite opportunity in not realizing that with the present lack of information about dust disease the one thing which should be done above all others is to try to reduce the amount of any kind of dust in the air which must be breathed by industrial workers.

D. Harrington,
Chief, Health and Safety Branch
U. S. Bureau of Mines.
Washington, D. C.

NEW CORPORATIONS

New England Lime Co., Adams, Mass. Capital 80,000 shares no par stock. Incorporators, Charles J. Winkler, Jr., Cambridge, Mass.; Foster E. Allison, Boston, Mass.; C. Russell Walton, Cambridge, Mass.

The Portsmouth Mixed Concrete, Inc., Portsmouth, O. Capital $5,000. Incorporators, Samuel E. Frowine, Henry H. Bayler, Ralph E. Frowine and S. Anselm Skelton.

Ohio Asphaltic Limestone Co., New Vienna, O. Capital $28,000. Incorporators, Neil Cashman, W. C. Mason, Jr., and John C. Cashman.

The Brookfield Sand & Gravel Co., Inc., Brookfield, Wis. Incorporators, Harry and G. Zirves, and E. Harden. Capital stock 250 shares at $100 each.

The Standard Gravel Co., 36 North Saginaw St., Pontiac, Mich. Capital stock $50,000.

Namdac Sand Co., Toms River, N. J. Agent, Jesse Schaem. Building materials.

The Remington Stone & Gravel Co., Montgomery, O. Capital $100,000. Incorporators, Ada Radabaugh, Marion Radabaugh, James L. Radabaugh. This company has taken over the properties of the defunct Queen City Crushed Stone & Gravel Co.

The Osborne & Marsellis Corp., Montclair, N. J. Capital $125,000 preferred stock and 2,500 n.p.c. Agent, Howard Crawford. To deal in stone and asphalt.

Marquette Cement Sales Corp., Dover, Del. Capital $10,000. Incorporators, C. R. Cummins, E. G. Salmons, E. P. Jones. Deal in cement and by-products.

The Hardin Gravel Co., Silsbee, Tex. Capital $20,000. Incorporators, Holmes Duke, Sr., Leslie Jarrett and others.

The Standard Asbestos Co., Portland, Ore. Capital 100 shares n.p.v. Incorporators, Amy Van Horn and Robert A. Leavy.

G. Bianchini & Co., San Francisco, Cal. Engaged in the rock, sand and gravel business.

Foreign Developments

Fineness Related to Strength of Cements

The data accumulated from regular tests of all Czechoslovak Portland cements at the German Technical College in Prague from 1922 on are the basis for a study of the relation of fineness to strength, reported by Dr. Alois Frank in *Zement* for October 18, 1934, (23:619-625). The study leads to the conclusions that for cement in the range of 2 to 14 per cent. residue on the 4,900-mesh/sq.cm. screen the fineness with relation to that screen is a factor not to be undervalued. The relation of the fineness of grinding to tensile and compressive strength of standard mortar, in a cement produced under uniform conditions, can be expressed by an exponential function. By determining the strengths for two widely different grindings of a cement this equation can be determined by calculation or by curves. The compressive strength, especially in the case of the shorter periods of storage, is considerably more influenced by the fineness of grinding than the tensile strength. On finer grinding the relation of tension to compression is disturbed. The curves prepared in the study suggest various possibilities of cement production and a basis for the creation of cement types adapted to various special needs.

Tries Granite as Possible Raw Material in Cement

Although the argillaceous components of Portland cement are in general derivatives of original rocks, the rocks themselves have possibly never been used as cement raw material. Occasionally, however, there may be some occasion to use such a rock, such as in localities where clay or marl is not available. Dr. D. Steiner, discussing this subject in *Tonindustrie-Zeitung* for February 11, 1935 (59: 167-168), discusses experiments using granite as a cement raw material. Granite of course contains close to the desired mixture of argillaceous materials, and has essentially only one defect in its composition, its alkali content. This content of alkalies, however, is partially volatilized in the burning process, and at any rate its amount is considerably less in proportion to the amount of cement mix than to the amount of the argillaceous material alone.

In the experiments reported granite was ground and used along with limestone in the preparation of a cement raw mix. For the purpose of comparison, another cement was burned from limestone and marl. The results of the setting and unsoundness tests were within the same range, and the strength tests run only a little less in the case of the "granite cement" than with the standard cement. At 28 days combined storage the granite cement had a compressive strength of 41 kg.-/sq.cm. as against 46 kg. for the standard cement, and the compressive strength was 630 kg. as against 635 with the cement from limestone and marl.

Certain practical difficulties, especially the expense of crushing and grinding the granite, are suggested.

Free Lime Not Reduced By Admixture of Trass

From a series of experiments on the determination of the free hydrate of lime in hardened cement and cement-trass mixtures, and also the combined hydrate of lime in hardened lime-trass mixtures, reported by V. Modt in *Zement*, 24:94-97, February 14, 1935, several observations and conclusions of interest are drawn. The specimens were stored in water in such a way as to shut out the carbon dioxide of the atmosphere for half a year before being tested.

It was found that the addition of trass to the cement does not diminish the amount of free hydrate of lime in the hardened cement. The blast-furnace cements contain after hardening much less liberated hydrate of lime than the Portland cements. Whether this is to be attributed to a combining of the hydrate of lime by the slag contained in blast-furnace cement or whether essentially the smaller proportion of Portland cements to these cements determined this result could not be decided from the experimental data.

The trasses in mixture with hydrated lime combine abundant quantities of lime, especially in the first stage of hardening, but in further hardening the combining of lime is very slight. A definite relation between the combining of the lime and the hardening capacity of the trass could not be established from the lime-trass mixtures.

High-Iron Quartzite Used as "Mineralizer"

To produce a good silica brick it is necessary to convert the greater part of the siliceous raw material into tridymite, so that the principal mass of the brick consists of a dense structure of tridymite crystals; this is accomplished by the maintenance for an adequate duration of time of temperatures in the ranges of 575, 1,000 to 1,150 and, especially, 1,460 to 1,480 deg. C. The process is facilitated by the presence of the greatest possible amount of amorphous silica in the raw material and becomes more difficult as the crystalline structure in the raw materials increases. Furthermore, the conversion to tridymite is favorably affected by the employment of certain "mineralizers," among the most active of which are iron oxide (FeO and Fe_2O_3) compounds.

Tests were made on the use of a quartzite with a high iron content as such a mineralizer. The material is a spoil from the stripping of an iron-ore deposit, containing 46.57 per cent. Fe_2O_3. It was employed in small quantities (2 to 9 per cent.), admixed with a mixture of two comparatively-pure silica quartzites in the manufacture of silica brick by ordinary commercial methods. The resulting bricks were thoroughly tested as to strength and refractory properties, the tests demonstrating that the iron-bearing quartzite is actually a suitable mineralizer for the purpose. The most satisfactory results were obtained with an admixture of 5 per cent., making the total iron content of the complete mix 2.75 per cent. Fe_2O_3.—Prof. P. P. Budnikoff and Dipl.-Ing. W. M. Paris, Kharkov, in *Tonindustrie-Zeitung* 59: 165-166, 191, Feb. 11 and 18, 1935.

Concrete 1850 Years Old Still Stands in Germany

Around 80 to 90 A. D. the Romans built a 70-kilometer aqueduct from the Eifel Mountains to the settlement called Colonia Agrippina in the Rhine Valley, now the city of Cologne. It was built of concrete, and was a trough about 2 meters high on an average, skirting the mountains, running underground at places and finally traversing the Rhine Valley on arches in the customary Roman fashion. The aqueduct was in service for at least 400 years, but eventually was destroyed and blocks cut from it for the construction of walls and towers in the vicinity.

Parts of the aqueduct and large amounts of the concrete so employed as building stone are still to be found in the region, and in *Zement* for April 11, 1935 (24:232-237), Prof. Richard Grün describes observations on the state of preservation of such remains and chemical studies of the composition of the concrete. The concrete shows extraordinary preservation, high strength and practically no weathering. It is produced of crushed limestone and quartz-sand mortar, with strongly hydraulic lime as the binder. On the interior the aqueduct is coated with a plaster which still adheres firmly. The aqueduct is a masterpiece of construction, according to Prof. Grün, and had it not been in such large measure destroyed would probably still be serviceable to-day.

Traffic News and Comment

Legislation

Government Ownership.—The most important bill before Congress relating to transportation at the present time is Senate Bill No. 2,573 introduced by Senator Wheeler, and the same bill introduced in the House by Representative Maverick, of Texas, as bill No. 7,541.

Senator Wheeler is chairman of the Senate Interstate Commerce Committee. In a radio address delivered by him on April 12 he gave his reasons why the government should take over the railroads, which included more efficient operation, better financing through government borrowing and the claim that the roads would be run on a basis that would give better service to the public.

The bill calls for payment in government-secured debentures which would be exchanged for the present securities. Management of the roads, which would be known as United States Railways, would be vested in five trustees, obligated to administer the properties in the public interest, independent of political considerations, and on a self-supporting basis. In the appointment of trustees, officers and employees, and their dismissal, promotion or demotion, no political qualification may be given consideration and officers of the United States or of any political party organization are forbidden to solicit or recommend any appointment, employment, dismissal, promotion or demotion.

While Coördinator Eastman believes in government ownership of the carriers eventually, he does not favor it at this time.

Much opposition to these bills is developing among shippers as well as railroad executives and employees. Many people can still remember the service rendered the public during the Railroad Administration during and after the war, and viewing the present governmental divisions, bureaus and other organizations are wondering how so large an organization as a railroad administration can be run without political domination regardless of the wording of the proposed law.

Opponents of the legislation are asking for some proof that the government can operate the roads more economically than the present owners. Where is there anything that is being run by the government that is being run economically?, they ask. Government ownership has cost the taxpayers of Canada $1,393,000,000, and has obligated them for $1,276,000,000 more and they have not been paid back one single dollar. If the government takes over the railroads what is to be done about motor-truck and waterway competition? If the railroads are taken over will that not be just another step in government ownership of industry?

Railroad Labor Legislation.—Various bills have been introduced in Congress relating to railroad labor. These include a bill to make 6 hr. the standard day on railroads for purposes of pay and overtime. Another bill would result in limiting the length of a train to approximately 60 cars. There is another bill which proposes to add more men to the crews of certain trains, and other bills which would regulate the hours of service, provide government track inspection and government signal inspection. It is estimated that if these bills were to become law the additional cost of transportation would be more than a billion dollars a year.

Motor-Vehicle Regulation.—The Eastman highway transportation regulation bill, Senate No. 1,629, was passed by the Senate on April 16, without a record vote and without much opposition. It is now being considered by the House. Briefly this bill provides that, beginning July 1, 1935, common carriers by motor vehicle, and to some extent contract carriers, and to a lesser extent private truckers, will be regulated as to interstate commerce by the Interstate Commerce Commission. In connection with private trucking the regulation is limited to the qualifications and maximum hours of service of employees and the safety and operation of equipment.

Certificates of public convenience and necessity are required for all common carriers; such certificates to be issued on application within 120 days after the law shall become effective to all carriers who were registered in 1934 under the code of fair competition. Permits are required for contract carriers, and will be issued on application within 120 days to registered carriers much as provided for certificates for common carriers. Rules for consolidation and merger and for the issuance of securities are provided. The Commission is given the right to provide rules for the filing of surety bonds, insurance policies, or qualifications as a self-insurer to insure the public against loss.

The proposed law relating to the establishment of through routes and through rates, and the filing of tariffs, the establishment of reasonable rates and charges, discrimination, undue preference and prejudice, follows closely the Interstate Commerce Act as it relates to common carriers by rail. In fact this act is to be known as Part II of the Interstate Commerce Act. Contract carriers are required to file schedules giving the rates, rules and regulations under which they operate, or, at the request of the Commission, to file copies of their contracts.

Sec. 20 of the present Interstate Commerce Act, which relates to receipts or bill of lading, is to apply to common carrier by motor vehicle.

Recent I.C.C. Decisions

Advanced Freight Rates.—By this time most of the members of the nonmetallic-minerals industry are familiar with the rates published in response to the decision of the Commission in the Emergency Freight Charges, 1935, case, at least in so far as these emergency rates relate to their particular branch of the industry. In the decision the Commission has referred a number of times to the emergency rate case of 1931. In that case several recommendations were made toward the stabilization of transportation. Among other recommendations was one that legislation be enacted that would place waterway and highway traffic under regulation much as the railway carriers are regulated. The increases granted in these proceedings were authorized in a way that would not be conducive to driving more railway traffic to the trucks. Four of the commissioners offered dissenting opinions. Several state commissions have not permitted the emergency rates to become effective on April 18, the day the interstate rates were effective; some permitting them to become effective on statutory notice and some suspending the proposed rates for further hearing. This has resulted in a great deal of confusion in quoting delivered prices on products where the basing-point system is used and interstate traffic is competitive with intrastate traffic.

The Birmingham Slag Co., American Gravel & Sand Co., Kirkpatrick Sand & Cement Co., Montgomery Gravel Co., Ocalla Lime Rock Corp., Roquemore Gravel & Slag Co., Stockbridge Stone Co., Southeastern Sand & Gravel Co., Underwood-Walker Co., and Woodstock Slag Corp., producers of crushed stone, sand, gravel and slag, have petitioned the Commission to withdraw the emergency charges on their products, or to modify the order to substitute for the authorized charges those proposed by the carriers. These producers in the petition say that they have sold thousands of tons of aggregates at a delivered price and that, through having to pay these charges, they will suffer the loss of thousands of dollars, and that the additional charges might result in the loss of so much business that they would have to close their plants.

Silica Sand.—The Commission has awarded reparation amounting to $148,528.12 in connection with the movement of silica sand from Ottawa, Ill., to various destinations in Indiana. Several consignees were involved. The original complaint was filed September 8, 1924, more than ten years having elapsed before the final decision awarding reparation, although the decision fixing the reasonable basis for rates was handed down some time ago.—I.C.C. Docket No. 16,250, Indiana State Chamber of Commerce *v.* B. & O. *et al.*

In another decision the Commission has awarded reparation amounting to $34,616.70 on the movement of silica sand from the Ottawa, Ill., district to Lockland, Reading and Bond Hill, O., under a prior finding of unreasonable rates in 188 I.C.C. 99.—I.C.C. Docket No. 17,272, Sub. 1, Philip Carey Mfg. Co. *et al. v.* B. & O. *et al.*, and sub. 2, Nivison-Weiskopf Co. *et al. v.* Same.

Sand.—The Commission has dismissed the complaint charging unreasonable rates on common sand from Lanesboro, Pa., to Afton, N. Y., in I.C.C. Docket No. 26,492, Frank Lewis & Sons, Inc. *v.* D. & H.

Molding Sand.—Reparation has been awarded the Walworth Co. on molding sand from Blissfield, Zanesville and Kent, O., to South Greensburg, Pa., in I.C.C. Docket No. 23,226, Ayres Mineral Co. *et al. v.* A. C. & Y. *et al.*

Examiners' Reports

Crushed Stone.—Examiner John J. Crowley proposes that the Commission find the rates and switching charges on crushed stone from Quartzite, Minn., to Creston, Ia., not unreasonable and dismiss the complaint in I.C.C. Docket No. 26,640, Currie Construction Co. *et al. v.* C. B. & Q. *et al.*

Silica Sand.—Examiner Edgar Snider recommends that reparation be awarded on a prior finding that the rates on silica sand from Ottawa, Ill., to Louisville, Ky., were unreasonable, in I.C.C. Docket No. 26,534, Standard Sanitary Mfg. Co. *v.* C. & E. I. *et al.*

Advisory Board Forecast

The forecast of the freight-car loadings for the second quarter of this year estimates the number of cars required for crushed stone, sand and gravel as 312,375, an increase of 4.9 per cent. over the actual loadings in the second quarter of last year; for cement the estimate is 107,128, an increase of 6.8 per cent.; and on lime and plaster the estimate is 29,418, an increase of 8.0 per cent. These figures are for the entire United States. Taking all commodities, the largest expected increase is in the Pacific Coast territory, 9.7 per cent., and the second largest in the Pacific Northwest territory, 9.0 per cent. The Mid-West territory estimates a decrease of 16.4 per cent. in the number of cars required and the Central Western territory a decrease of 13.5 per cent. The country as a whole will need 4,605,737 cars, an increase of 4.1 per cent. over last year.

Questions and Answers

Q.—The railroad company sometimes fails to "spot" cars just where we want them. Can we compel them to "spot" the cars at the point we designate if the shipments are interstate?—ILLINOIS.

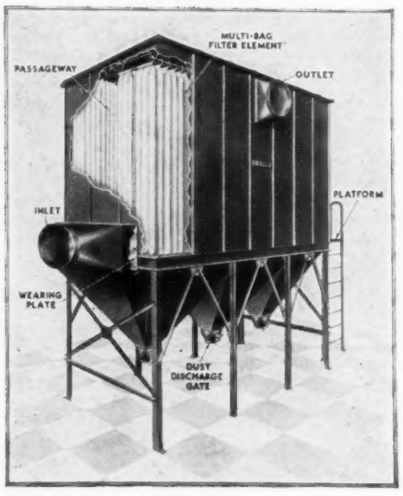
A.—The Interstate Commerce Commission has ruled in 29 I.C.C. 212, "that possibly carriers may be required upon reasonable compensation, to 'spot' cars"; but this compensation would have to be more than the line-haul rate, for it says in 63 I.C.C. 47, "Placing cars within complainant's plant on the interchange track of its railway, a plant facility, constituted deliv-

(*Continued on page 67*)

New Machinery and Supplies

Multi-Bag Dust Filter Has Efficient Shaking Mechanism

The Dracco Corp., Cleveland, O., successors to the Dust Recovery & Conveying Co., announces the new Dracco multi-bag filter for dust control. In the development of this new unit the company followed the design used in the Dracco automatic filter which has been successfully used for many years. The new unit is said to have a low initial cost, low operating and maintenance costs, and high dust-collecting efficiency. It complies with the present state codes.



New multi-bag dust collector for indoor or outdoor installation.

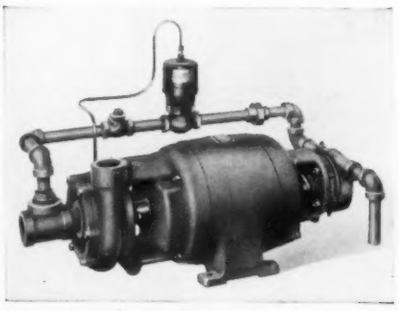
The multiple filter bags used are made entirely of cloth and are said to be easy to insert into and remove from the filter compartment. The efficient shaking mechanism used gives an up and down motion which is said to make the bags practically 100 per cent. clean after each shaking. All working parts of this filter are easily accessible and the motor and gear drive are outside the casing to facilitate inspection and lubrication. The dust-laden side of the filter need never be entered, as bags are changed from the clean air side. The filter house is of weatherproof steel construction, which makes it suitable for outdoor installation.

New Round and Parallel Type Shot-Firing Cords

Two new types of all-rubber shot-firing cords have been announced by the General Electric Company's Merchandise Department, Bridgeport, Conn. One of the new items is a round-type, the other a parallel-type cord. The round-type cord is said to be especially suitable for battery shooting in damp and wet places. Its all-rubber construction makes it resistant to abrasion and mechanical injury, as well as to the action of oil, acid, and gas. A red rubber finish serves as a distinctive identification for these two types of shot-firing cords.

New Centrifugal Pump Has Automatic Positive Primer

The Worthington Pump and Machinery Corp., Harrison, N. J., announces an automatic self-priming Monobloc centrifugal pump without floats, hand-operated valves or recirculation. This is accomplished through the use of the Worthington-built Hytor, which is a positive primer placed on the same shaft as the motor and



Centrifugal pump with automatic self-priming feature.

pump. When the pump is primed a pressure-operated cutout automatically unloads the Hytor. The only requirement is said to be a reasonably tight suction line. The unit is neat and compact, with a splash-proof streamlined motor all on a symmetrical mounting.

Trailer Designed to Haul Shovel Is Self-Loading

The Bucyrus-Erie Co., South Milwaukee, Wis., announces a new trailer for carrying their 10-B excavator swiftly and economically over long or short distances. This trailer has front-axle steering, dual-pneumatic tires, rear-wheel brakes and a simple and effective loading system. Overall height of the 10-B shovel mounted on the trailer is only 10 ft. 8-in. and the weight on each axle of the trailer is only 10,300 lb.

Only four simple steps are said to be necessary in loading. First the trailer front axle is disconnected and then the shovel moves into place over the rear assembly under its own power. The trailer is then reassembled and the frame raised into position with a built-in screw jack. The machine is then fastened by clamping the excavator axles to the trailer frame.

Horizontal Single-Stage Air Compressor Announced

The Chicago Pneumatic Tool Co., New York, N. Y., recently announced the new Type T horizontal single-stage air compressor which is made with capacities from 89 to 123 cu. ft. per min. It is double-acting, water-cooled, and arranged for belt or direct-connected motor drive. Features of this new unit include Simplate valves, tapered-roller main bearings, wedge-adjustable connecting rod, inlet valve unloading system, double-counterweighted crankshaft, and completely-enclosed frame with oil-tight and dust-proof covers. The cylinder, cross-head faces and cross-head guides are ground to size.

Lightweight Sinker Drill Designed for Soft Drilling

The Gardner-Denver Co., Quincy, Ill., announces the new Model S-35 lightweight dry sinker drill which is particularly designed for drilling in soft and medium formations and is said to be admirably suited for plugging in quarries. This drill weighs 28½ lb. complete, has a cylinder

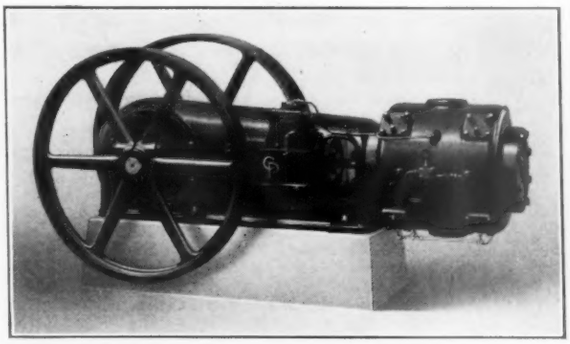
Lightweight dry sinker drill for soft or medium formations.

bore of 2¼ in., and uses ⅞-in. steel. Features of the drill are the full-grip handle, one-piece exhaust control and handle, simple rugged steel puller, totally-enclosed short-throw tubular valve, etc.

Relay Operates Bailey Potentiometer Pyrometer

Bailey Meter Co. of Cleveland, O., developed a new potentiometer pyrometer which has been named "Galvatron" after the galvanometer-electronic relay circuit which it employs to operate slide wire resistances and recording pens.

One Galvatron may include as many as four potentiometer circuits, the contact making galvanometer being automatically switched from one circuit to the next by relays actuated from contacts made by a synchronous-motor-driven time device. One powerful synchronous motor drives these timing contacts for the relay as well as the galvanometer contacting mechanism, the recording chart, and the automatic standardizing relay contacts.



Horizontal, double-acting single-stage air compressor.

Potentiometer pyrometer.

Because of the small current flow required to operate the electronic relay, it is possible to use light pressures on the galvanometer contacting mechanism without danger of burning.

An outstanding feature of the Bailey Galvatron is its continuous record or records, up to four in number, made on a circular recording chart. When more than one record is provided for, each is made in a different color of ink so that it can be distinguished from the others on the chart, regardless of how many times they cross each other.

A new photo-cell smoke-density recorder compensated for variations in light source intensity and operated by the galvatron electronic relay circuit was another Bailey Meter Co. development. This equipment consists of a receiving element in the form of an attractive recorder which is usually mounted on the individual boiler panel board and a transmitting element consisting of a projecting cylinder and a detecting cylinder which are mounted on opposite sides of the breeching or flue gas passage.

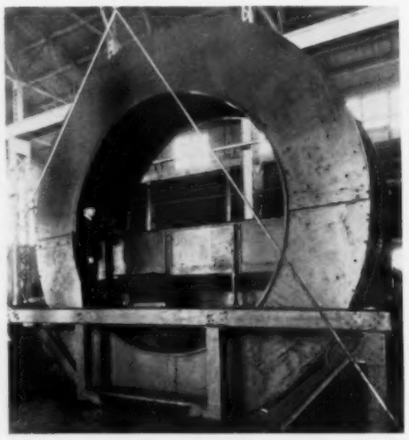
Horizontal Air Compressor Has Air Cushioned Valves

The Pennsylvania Pump and Compressor Co., Easton, Pa., announces the Class 3AT air cushion valve compressor. It is of the single-stage, double-acting, horizontal, roller-bearing type, adapted for heavy-duty service and is available in sizes from 5 to 125 hp. and for pressures from 12 to 150 lb. The connecting rod and crankshaft are steel forgings and double-row Timken tapered roller bearings on each side of the latter are mounted in heavy housings. The crosshead and piston are of the box type and the piston rod is extra large. The air cushion valve is similar to those used for years on compressors made by this company. Other features include continuous lubrication, float oil gauge, self-locking gland nuts, automatic start and stop control and dual control. Equipment for any type of drive can be supplied.

Basic Design Is Retained in Improved Hadsel Mill

The Hardinge Co., Inc., York, Pa., announces the improved Hadsel mill, which has undergone extensive development since it was originally announced three years ago. The present design retains the basic principle of the original mill, in that it lifts the raw material in buckets inside a drum and drops it on sloping breaker plates at a sufficient height to give a violent crushing and grinding action. This ends the similarity, however, as the company has altered the construction and operation of this mill in order to eliminate the defects found in the original design.

In the new Hardinge-Hadsel mill the drum is suspended in a cradle on roller bearings. The frictional resistance is said to be so low that an empty mill can be turned freely by one man. The walls are extended in the drum above the buckets so that it operates as a self-contained



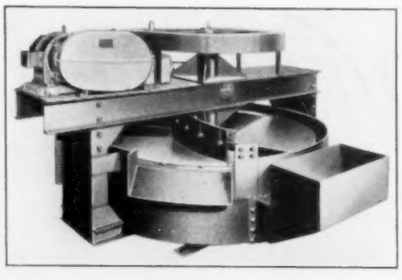
Improved classifying and grinding mill.

unit. The ore is dropped on the breaker plates, where both fines and coarse drop back into the buckets. Enough water is added to create the proper consistency. On the rising side of the mill ahead of and above the first breaker plate is a take-off grizzly. This rejects the coarse oversize and allows it to pass directly back into the mill while the undersize flows by gravity to an outside classifier. The oversize from the classifier returns to the mill by gravity, completing the cycle. Products ranging in size from 20-mesh up to 200-mesh are obtained through the ordinary means of control of classifier speed, density, etc. The new mill is said to balance its operation automatically when the feed varies in size.

Perfect Device for Sand Recovery and Dewatering

The Link-Belt Co., Chicago, Ill., announces the Link-Belt dewatering Rotoscoop as a perfected device for recovering fine or coarse sand and similar material. Several machines already built and placed in service are said to have given satisfactory performance. This device is said to recover available sand grains of sufficient fineness to meet specifications, and discharge the product dry enough to permit truck transportation or mechanical conveying to and from storage.

The Rotoscoop is a self-contained machine consisting essentially of a large circular steel tank; a suspended rotating disk to the underside of which are attached inclined and adjustable renewable



Perfected device for classifying and dewatering sand.

scoops for moving the material within the tank; a curved steel adjustable plow mounted in a stationary position above the disk for discharging the dewatered product. The driving machinery is mounted above the tank on the same steel supports from which the rotating disk is suspended. The driving mechanism consists of an electric motor, an encased automatic-lubricating silent-chain drive, enclosed worm-gear reducer, and a pair of spur gears with steel guards.

The action of the Rotoscoop is said to differ from that of other dewatering machines. The rotating scoops force the material above the water through openings in the revolving disk to which the scoops are attached, and in so doing, they compress the material so that the water is effectually squeezed out. There is also said to be some gravity drainage while the disk carries the material around to the discharge plow whose circular shape serves to further squeeze, drain and dry the material. The slow speed of rotation is said to assure minimum maintenance expense and the small lift of the material required contributes to low power consumption. Volume of fines and grading of the product can be varied by raising or lowering the overflow weir or varying the speed of rotation or both. This machine is made in four sizes of 15-, 12-, 9-, and 6-ft. diameters, with capacities ranging from 20 to 150 tons per hour, based on material weighing 100 lb. per cu. ft.

Mechanical Device Imparts Horizontal Shaking Motion

The Ajax Flexible Coupling Co., Westfield, N. Y., has developed the Shaler shaker, a mechanical device for imparting a horizontal shaking or screening motion to a sieve, a conveyor, or any other unit demanding such motion. Mechanically this shaker consists of two weights geared together so that when one is driven both weights rotate at the same speed but in opposite directions. The unit has positive lubrication by the splash system and can be driven either by belt or direct drive. It has full-floating inner bearings and the gear housing and inner bearing support member is cast integral with the central frame portion to assure true alignment of gears and driving shafts.

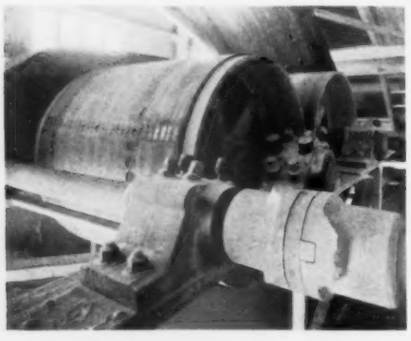
Mechanical device which imparts horizontal shaking motion.

New Lubricants Designed for Heavy-Duty Gear Use

A series of new lubricants designed to meet extreme pressure gear lubrication problems has just been announced by E. F. Houghton & Co., Philadelphia, Pa., as an addition to its oils bearing the brand name of "STA-PUT."

This is a viscous oil series in which is said to be incorporated the greatest load-carrying capacity heretofore obtained. These lubricants were produced for modern heavy duty gear lubrication which demands high viscosity with extreme pressure characteristics.

The company states that actual tests on standard measuring machines show that STA-PUT 600 Series Extreme Pressure Gear Lubricants are capable of withstanding from 3 to 5 times the load that straight mineral oils of the same type without these E. P. characteristics are capable of doing. Further, it is stated that actual torque readings prove that these lubricants will carry these loads



Flexible Steel Lacing Co. Flexco belt fastener on conveyor in plant of Sturgeon Bay Co., Sturgeon Bay, Wis. This joint was installed in 1929 and had carried over 4,000,000 tons of crushed limestone up to Oct. 12, 1934.

with reduced frictional losses of as much as 30 per cent. to 50 per cent. as compared with the same oils before treatment.

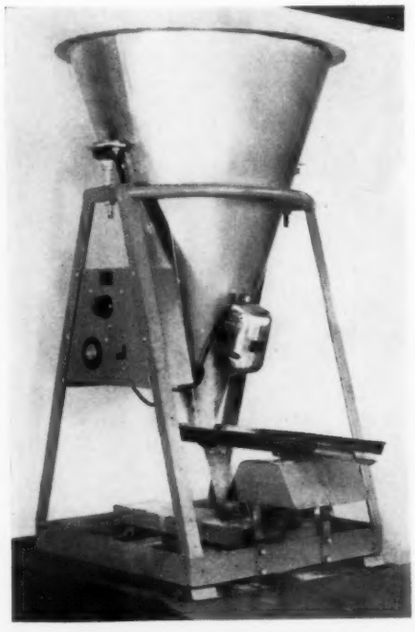
This range covers all of the requirements from that of light duty speed reducers to the heaviest of worm or herring bone type of speed reducers operating under shock loads.

Kiln end made by the Chicago Steel Foundry Co.

Wide Range of Capacities Vibrating Feeder Made in

A vibratory dry feed machine consisting of a vibrating trough feeder, a vibrated hopper, a rheostat controlling the volume of flow of the feeder with an indicator, and a control box for the two vibrating elements, has been announced by Syntron Co., 400 North Lexington Avenue, Pittsburgh, Pa. This machine has a capacity from 2 ounces to 2,000 pounds per hour, making it readily adaptable to a wide range of needs.

The vibrating feeder causes the dry material to flow forward out over the end of the trough solely by vibration. A steady discharge from the hopper into the feeder is provided by the small vibrator mounted on the side of the hopper, which keeps the contents agitated. The volume of flow through the feeder is regulated by the rheostat controlling the power input to the feeder vibrator. The discharge opening of the hopper into the feeder is made larger by tilting the bottom of the hopper forward over the shelf in the feeder trough. The flow stops instantly with the throw of the switch, there being no momentum to stop. There are no motors, gears, slide valves or wearing parts. The vibrators are simple electro-magnets with all the movements through flat leaf springs and live rubber.



Vibrating feeder for dry material.

MANUFACTURERS' PUBLICATIONS

Telsmith Pulsator. 8 p. (Bull. No. 066-J., Smith Engineering Works, Milwaukee, Wis.). Describes the new heavy-duty Pulsator vibrating screen which is specially designed for both dry and wet screening of sand, gravel, crushed rock, etc.

Hendrick Products. (Hendrick Manufacturing Co., Carbondale, Pa.) Describes and illustrates the Hendrick line of perforated metal screens, elevator buckets, chutes, open steel flooring, aggregate testers, etc.

Vanderwerp Recuperator. 6 p. (Manitowoc Engineering Works, Manitowoc, Wis.) Describes and illustrates the Vanderwerp recuperator for rotary kilns. Principles involved in the operation of this unit are also discussed.

Safety Equipment. 8 p. (Mine Safety Appliances Co., Pittsburgh, Pa.) Describes and illustrates the various types of safety equipment made by this company including goggles, lamps, respirators, first aid equipment, stretchers, Skullgards, shoes, belts, etc.

Goggle Parts. (Goggle Parts Co., Cleveland, O.) Describes and illustrates a complete line of goggle parts, helmets, shields, etc.

Automatic Air Filter. 4 p. (American Foundry Equipment Co., Mishawaka, Ind.) Describes and illustrates the new American automatic air filter with static pressure control.

Self-Priming Centrifugal Pump. 4 p. (Bull. W-323-B3, Worthington Pump and Machinery Corp., Harrison, N. J.) Describes and illustrates the automatic self-priming Monobloc centrifugal pump.

Multi-Bag Dust Filter. 4 p. (Bull. No. 301, Dracco Corp., Cleveland, O.) Describes and illustrates the new Dracco multi-bag filter-type dust collector.

Sand and Dredging Pumps. 16 p. (Cat. No. 34, Georgia Iron Works, Augusta, Ga.) Describes and illustrates the complete line of centrifugal sand and dredging pumps made by this company.

High Temperature Cements. 4 p. (Bull. No. 205, General Refractories Co., Philadelphia, Pa.) Describes the various types of fire clay and cyanite base high-temperature cements made by this company.

Motorized Speed Reducers. 20 p. (Cat. No. 1515, Link-Belt Co., Chicago, Ill.) Describes and illustrates a newly-developed line of motorized speed reducers in which the motor is mounted directly on the side of the reducer housing.

1935 Operators Handbook. 44 p. (B. F. Goodrich Co., Akron, O.) Contains information of a more or less technical nature on truck, bus, farm service and industrial tires.

Babcock & Wilcox Moves to New Chicago Office

The Chicago office of the Babcock & Wilcox Co.—maker of coal-pulverizing, transporting and burning equipment for boilers, driers and kilns; raw-material pulverizing and feeding equipment; driers; and Elvenite, Adamantine and gray-iron castings—has been moved to 140 S. Dearborn St. M. R. Woodward is manager of the company's cement division in the Chicago territory.

Blaw-Knox Creates Office of Chairman of the Board

Directors of the Blaw-Knox Co., Pittsburgh, Pa., recently elected Albert C. Lehman, president, to the newly-created office of chairman of the board. Irvin F. Lehman, vice-president, succeeds to the office of president and Frank Cordes has been named senior vice-president. Other retiring officers were re-elected.

Worthington Creates New Eastern Oil Power Div.

The Worthington Pump & Machinery Corp., Harrison, N. J., has created an Eastern Oil Power Division under the field management of Ray L. Howes, with headquarters at its New York office, 2 Park Ave.

Victor J. Mill Acquires Lawrence Machine & Pump

Victor J. Mill of Baldwinsville, N. Y., announces that he has purchased the Lawrence Machine & Pump Co. of Lawrence, Mass., and will continue to operate it under the name of the Lawrence Machine & Pump Corp. This company, which was established in 1882, is said to have made the first centrifugal pump in the United States. Mr. Mill, who has been prominent in the industry for nearly 20 years, plans to continue the "Lawrence" line of pumps with many new improvements in design. The line will include centrifugal pumps for a broad and varied field, notably single and multi-stage water pumps, stock pumps, sewerage and sludge pumps, slurry pumps, chemical pumps and sand and dredging pumps.

In addition the plant will build hydraulic dredges and special machinery, a field in which Mr. Mill has had a wide experience. The plant is particularly well equipped for this latter type of work.

Link-Belt Portland Office and Warehouse Are Moved

The Link-Belt Co., Chicago, Ill., announces the moving of its Portland, Ore., warehouse to a new location at the corner of 14th Ave. and Savier St. The company's sales office will also be located at the same address, 1637 N. W. 14th Ave. D. L. Shirley is resident manager.

Sullivan Mach. Co. Chicago Office Now in Wrigley Bldg.

The Sullivan Machinery Co., formerly located in the Wrigley building, has opened new offices in the Bell building, 307 N. Michigan Ave., Chicago, containing 9,543 square feet of floor space.

Complete New Explosives Plant in So. California

The Halafax Explosives Co., has completed a new explosives plant near Saugus, Cal., which is said to be the first in southern California. A full line of explosives ranging from low strength, free-running to the higher nitroglycerin equivalents, will be produced. Prior to plant erection, five years were spent in testing Halafax explosives in the mining, quarrying and contracting industries in California.

Traffic *(from page 64)*

ery at such industry under the line-haul rates." In 57 I.C.C. 677 it has ruled that, "the legal obligation of a carrier does not necessarily go to the extent of requiring it to 'spot' cars at places of unloading or to take cars from places of loading within a plant. Its obligation as to delivery may be complied with when the cars are placed on the interchange track or on the spur within the plant connecting with the interchange track."

Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

Although every effort is made to insure accuracy and completeness in these listings, the publisher cannot accept responsibility for errors or omissions. Any mistakes discovered will gladly be rectified, if brought to the attention of the Advertisers' Service Department.

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Abrasives
*Pangborn Corp.

Aggregate-Bituminizing Plants
Hetherington & Berner, Inc.

Agitating Ladders (Dredge)
*Eagle Iron Works

Agitators, Thickeners and Slurry Mixers
*Hardinge Co.
*Smidth & Co., F. L.

Air Compressors (Portable)
Fuller Co.
Gardner-Denver Co.

Air Compressors (Stationary)
Fuller Co.
Gardner-Denver Co.

Air-Conditioning Equipment
*Pangborn Corp.

Air Filters
Dracco Corp.

Air Pumps
Fuller Co.
Gardner-Denver Co.

Air Separators
Gay, Rubert M.
*Hardinge Co.
*Pangborn Corp.
Raymond Bros. Impact Pulv. Co.
Universal Road Machy. Co.

Alloys (Steel)
Ryerson & Son, Joseph T.

Anti-Freeze Solution
Firestone Tire & Rubber Co.

Ash and Refuse-Handling Equipment
*Allen-Sherman-Hoff Co.
American Manganese Steel Co.
Haiss Mfg. Co., Geo.
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*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Automatic Feeders
American Manganese Steel Co.
Fuller Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Automatic Weighers
Fuller Co.

Babbitt Metal
Ryerson & Son, Joseph T.

Backfillers
*Austin-Western Road Machy. Co.
*Harnischfeger Corp.
*Lima Locomotive Works, Inc.

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*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Balls (Tube-Mill, etc.)
*Allis-Chalmers Mfg. Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Smidth & Co., F. L.

Batteries
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Bearings (Anti-Friction)
Hetherington & Berner, Inc.
*Link-Belt Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Belt Fasteners
Flexible Steel Lacing Co.

Belting
Goodyear Tire & Rubber Co.
Haiss Mfg. Co., Geo.
*Link-Belt Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.
United States Rubber Co.
*Wickwire Spencer Steel Co.

Belt Lacings
Flexible Steel Lacing Co.

Belting (Multiple V)
Goodyear Tire & Rubber Co.

Belts (Fan)
Firestone Tire & Rubber Co.
Goodyear Tire & Rubber Co.
United States Rubber Co.

Bin Gates
*Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Fuller Co.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
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*Robins Conveying Belt Co.
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Sprout, Waldron & Co.

Bins (Cast Iron)
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Bins (Steel)
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*Hendrick Mfg. Co.
Hetherington & Berner, Inc.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
*Pioneer Gravel Equip. Mfg. Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

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Blasting Machines
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Du Pont de Nemours & Co.
*Ensign-Bickford Co.

Blocks (Sheave)
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Haiss Mfg. Co., Geo.
*Sauerman Bros., Inc.
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Blowers
*Pangborn Corp.

Bodies (Motor Truck, Concrete Mixing)
Jaeger Machine Co.

Boots (Rubber)
Goodyear Tire & Rubber Co.
United States Rubber Co.

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Mott Core Drilling Co.
Pennsylvania Drilling Co.

Brake Linings
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Bronze Work (Ornamental)
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Buckets (Clamshell, Orange-Peel, Etc.)
Haiss Mfg. Co., Geo.
*Harnischfeger Corp.
*Link-Belt Co.

Buckets (Dragline—Cableway)
American Manganese Steel Co.
*Link-Belt Co.
*Pioneer Gravel Equip. Mfg. Co.
*Sauerman Bros., Inc.

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*Hendrick Mfg. Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
*Pioneer Gravel Equip. Mfg. Co.
*Robins Conveying Belt Co.
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Sprout, Waldron & Co.

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Sprout, Waldron & Co.

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*American Steel & Wire Co.
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*Roebling's Sons Co., John A.
*Sauerman Bros., Inc.
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*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

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Central Concrete-Mixing Plants (Complete)
Sprout, Waldron & Co.

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Ryerson & Son, Joseph T.

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*Link-Belt Co.

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Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Sprout, Waldron & Co.

Chutes and Chute Liners
American Manganese Steel Co.
Goodyear Tire & Rubber Co.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
*Robins Conveying Belt Co.
*Smidth & Co., F. L.
Sprout, Waldron & Co.

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*Deister Machine Co.
*Hardinge Co.
Iowa Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Knickerbocker Co.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
*Pangborn Corp.

Clips (Wire Rope)
*American Steel & Wire Co.
*Roebling's Sons Co., John A.
*Wickwire Spencer Steel Co.

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*Jeffrey Mfg. Co.
*Link-Belt Co.
Sprout, Waldron & Co.

Coal
Technicoal Sales Corp.

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*Allis-Chalmers Mfg. Co.
Bonnot Co.
Gay, Rubert M.
*Hardinge Co.
*Jeffrey Mfg. Co.
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*Smidth & Co., F. L.
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Iowa Mfg. Co.
*Jeffrey Mfg. Co.
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*Robins Conveying Belt Co.
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*Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
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Fuller Co.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
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*Robins Conveying Belt Co.
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*Jeffrey Mfg. Co.
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*Smidth & Co., F. L.

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*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Cranes (Crawler and Locomotive)
*Austin-Western Road Machy. Co.
*Harnischfeger Corp.
*Lima Locomotive Works, Inc.
*Link-Belt Co.

Cranes (Overhead)
*Harnischfeger Corp.

Crusher Parts
American Manganese Steel Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.

Crushers (Cone)
Nordberg Mfg. Co.

Crushers (Hammer)
*Allis-Chalmers Mfg. Co.
*Austin-Western Road Machy. Co.
Bonnot Co.
*Dixie Machy. Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Crushers (Jaw and Gyratory)
*Allis-Chalmers Mfg. Co.
*Austin-Western Road Machy. Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
New Holland Machine Co.
Nordberg Mfg. Co.
*Pioneer Gravel Equip. Mfg. Co.
Smith Engr. Works
Universal Road Machy. Co.

Crushers (Roll)
*Allis-Chalmers Mfg. Co.
*Austin-Western Road Machy. Co.
Bonnot Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
*Pioneer Gravel Equip. Mfg. Co.
*Robins Conveying Belt Co.

Crushers (Rotary)
*Allis-Chalmers Mfg. Co.
*Austin-Western Road Machy. Co.
Bonnot Co.
New Holland Machine Co.

*** See also information in the 1935 Pit and Quarry HANDBOOK.**

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More Capacity!

Lower Costs!

Positive Uniformity!

Greater Efficiency!

The capacity of grinding mills is materially increased by this new Gayco Centrifugal Air Separator. Fines are removed as they are made.

It delivers an absolutely uniform product of any fineness desired from 60 to 400 mesh with greater capacity and lower power cost than is possible with any other type of air separator.

It is slow speed, requiring very little power. Repair costs are practically nothing—the only wearing parts are the steel cut gears and bearings enclosed in a dust proof casing.

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RUBERT M. GAY

Division, Universal Road Machinery Company

114 Liberty St. New York, N. Y.

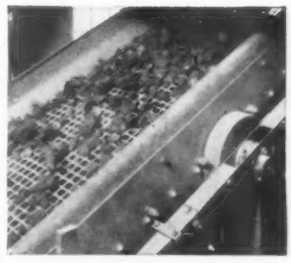
Crushing, Screening, Washing

equipment—Reliance—in capacities from 50 to 1500 tons per day. Built with simplicity of design for long hard service with low maintenance costs. Send for catalog and full information.

Universal Road Machinery Co.

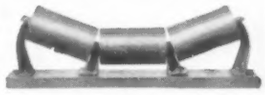
Kingston, N. Y.

But, *you can still enjoy a Trade Advantage - - - -*



THE man with the best product gets the business today. The buyer of sand, gravel and stone is taking an unprecedented interest in cleanness and uniformity now that the matter of price is no longer an issue. His attitude, however, is a blessing in disguise, for the necessary equipment to produce clean product naturally saves the producer in production, power and maintenance costs. A Robins engineer will gladly call and make a survey of your plant and suggest how to bring it up-to-date either in one fell swoop or by a series of easy improvements that will be justified by savings in production. This service is gratuitous . . . send in the coupon today.

EQUIPMENT ITEMS



Conveyor Idlers
Screens
Conveying Belts
Bucket Elevators
Bin Gates

Robins Screens and Material Handling units and complete installation are described in literature that will be sent on request.

MATERIAL HANDLING ROBINS EQUIPMENT

Robins Conveying Belt Co.
15 Park Row, New York City

I would be pleased to have as checked Representative call ( )
Gyrex Screen Book ( ) Equipment Bulletin ( ).

Name .....

Firm .....

Town ..... State .....

Classified Buyers' Guide

A Directory of Pit and Quarry Advertisers Arranged According to Product

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*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
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Detonators
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Dippers and Teeth (Power Shovel)
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Dragline Cableway Excavators
*Link-Belt Co.

Dragline Excavators
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*Link-Belt Co.

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Dracco Corp.
*Pangborn Corp.
Raymond Bros. Impact Pulv. Co.

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Dracco Corp.
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*Jeffrey Mfg. Co.
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*Allen-Sherman-Hoff Co.

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*Ensign-Bickford Co.

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*Eagle Iron Works
*Hendrick Mfg. Co.
Iowa Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdy. & Mach. Co.
*Robins Conveying Belt Co.
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Universal Road Machy. Co.

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*Jeffrey Mfg. Co.
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*Pioneer Gravel Equip. Mfg. Co.
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Sprout, Waldron & Co.

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*Hendrick Mfg. Co.
*Link-Belt Co.

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United States Rubber Co.

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Firestone Tire & Rubber Co.
Goodyear Tire & Rubber Co.
United States Rubber Co.

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*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Smith Engr. Works
Sprout, Waldron & Co.

Kilns and Coolers (Rotary)
*Allis-Chalmers Mfg. Co.
Bonnot Co.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Smidth & Co., F. L.

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*Hardinge Co.

Kominuters
*Smidth & Co., F. L.

Lenses (Goggle)
Pulmosan Safety Equipment Corp.

Lime-Handling Equipment
Fuller Co.
*Hardinge Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Raymond Bros. Impact Pulv. Co.
*Robins Conveying Belt Co.

Lime and Hydrating Plants
*Hardinge Co.

Lime Kilns
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Linings (Ball- and Tube-Mill) (See Mill Liners and Linings)

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Fuller Co.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

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*Lima Locomotive Works

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*Jeffrey Mfg. Co.

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Ryerson & Son, Joseph T.

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Firestone Tire & Rubber Co.
Goodyear Tire & Rubber Co.
United States Rubber Co.

Mill Liners and Linings
American Manganese Steel Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Smidth & Co., F. L.

Mills (Grinding) (See also Crushers—Hammer)
*Allis-Chalmers Mfg. Co.
Bonnot Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Knickerbocker Co.
Lewistown Fdy. & Mch. Co.
Raymond Bros. Impact Pulv. Co.
*Smidth & Co., F. L.
Sprout, Waldron & Co.

Motors and Generators
*Allis-Chalmers Mfg. Co.
*Harnischfeger Corp.

Motors (Internal-Combustion) (See Engines — Internal-Combustion)

Motor Trucks
Mack Trucks, Inc.

Nails
*American Steel & Wire Co.
Ryerson & Son, Joseph T.

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Smith Wire & Iron Works, F. P.

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*Deister Concentrator Co.

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Smith Wire & Iron Works, F. P.

Paving Mixers
Jaeger Machine Co.

Perforated Metal Plates
*Allis-Chalmers Mfg. Co.
Chicago Perforating Co.
*Hendrick Mfg. Co.
Morrow Mfg. Co.
Ryerson & Son, Joseph T.
Sprout, Waldron & Co.
*Wickwire Spencer Steel Co.

Pipe, Dredge (Floating and Shore)
Taylor Forge & Pipe Works

Pipe Flanges
Hetherington & Berner, Inc.
Ryerson & Son, Joseph T.
Taylor Forge & Pipe Works

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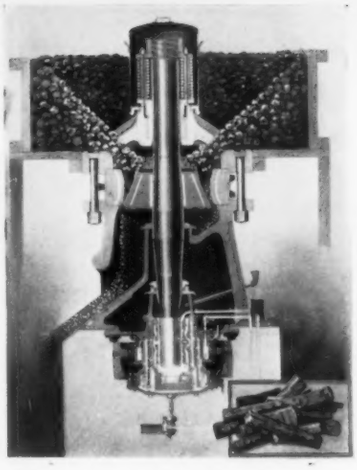
Pneumatic Drills (See Drills, Rock)

Portable Conveyors
Fuller Co.
Haiss Mfg. Co., Geo.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Portable Crushing and Screening Plants
*Austin-Western Road Machy. Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Pioneer Gravel Equip. Mfg. Co.

*** See also information in the 1935 Pit and Quarry HANDBOOK.**



GREATER TONNAGE with HALF THE POWER COST *Guaranteed!*

The Kennedy Ball Bearing Gearless Gyratory Crusher is guaranteed to produce a greater tonnage than any other crusher of a given size, with half the power per ton of ore. This crusher can be equipped with a synchronous motor in its pulley, or driven by flat or V-belt from a standard motor.

The Savings Effected with this crusher are astounding:
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In Power.....The entire cost of crusher and motor in pulley is amortized annually.

Sieving test on glacial gravel crushed at the rate of 18 tons per hour, with No. 19 crusher set to ⅛ in., and using less than 15 hp., follows:

Minus ⅜ in.	100%
Plus 3 mesh	21½%
Minus 3—Plus 4	17%
Minus 4—Plus 14	36½%
Minus 14—Plus 48	15%
Minus 48—Plus 100	4%
Minus 100	5½%

KENNEDY VIBRATING SCREEN

Double Strength

High-Class Workmanship and Material

Greatest Capacity Guaranteed

No repair parts sold after 4 years in use except screen cloth

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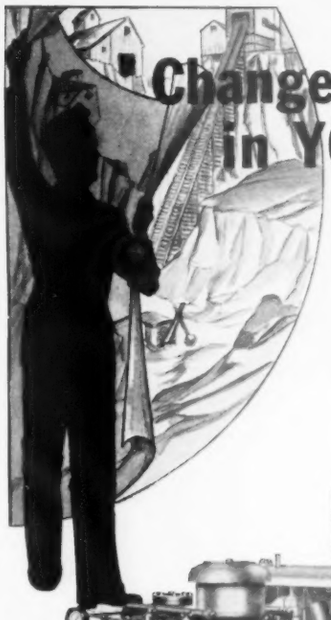
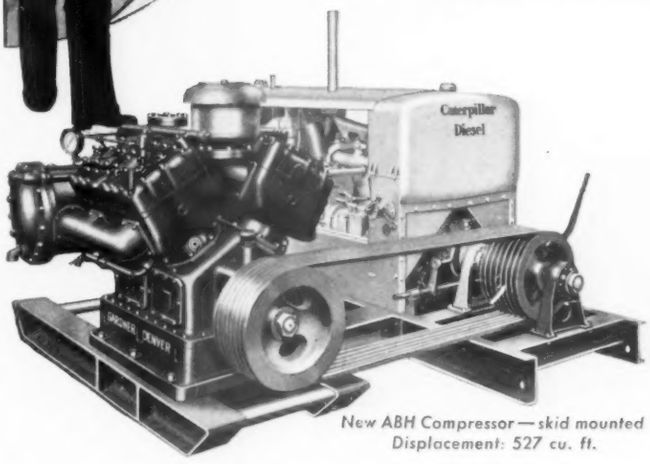


Change the Picture in YOUR Quarry with this NEW Two-Stage, Water-Cooled Diesel-Driven Compressor



New ABH Compressor—skid mounted
Displacement: 527 cu. ft.

IF your power costs have been running too high... if you haven't had *enough* air for your jobs... here's the compressor that will change the picture. With the new Gardner-Denver ABH Diesel-driven compressor, you are sure of having an ample, dependable supply of air for drills, stone chisels, air hoists, lifts, direct-acting pumps and many other uses—PLUS lower power and maintenance costs and the tremendous fuel saving that the "Caterpillar" Diesel drive makes possible.

Backed by a world-wide reputation for quality, Gardner-Denver Two-Stage ABH Compressors give you advanced features of design obtainable nowhere else. Let us show you what these newcompressorscan do in YOUR quarry!

TWO-STAGE— to give you more air . . . cleaner, drier air . . . lower power cost.

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DIESEL-DRIVEN— to provide substantial savings in fuel costs.

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GARDNER-DENVER

MAKES AIR DO MORE AND COST LESS

Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

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*Allis-Chalmers Mfg. Co.
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*Deister Concentrator Co.
*Deister Machine Co.
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*Eagle Iron Works
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*Jeffrey Mfg. Co.
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Sprout, Waldron & Co.
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*Austin-Western Road Machy. Co.
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*Link-Belt Co.
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Smith Wire & Iron Works, F. P.
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Ryerson & Son, Joseph T.
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Hetherington & Berner, Inc.
Sprout, Waldron & Co.
Storage Equipment
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Sauerman Bros., Inc.
Sweeping Systems
*Allen-Sherman-Hoff Co.
Tanks
*Hendrick Mfg. Co.
*Link-Belt Co.
Tanks (Sand-Settling)
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Morrow Mfg. Co
*Pioneer Gravel Equip. Mfg. Co.
Smith Engr. Works
Testing Sieves and Shakers
*Hendrick Mfg. Co.
Thickeners (Slurry)
*Hardinge Co.
Tire Repair Materials
Firestone Tire & Rubber Co.
Goodyear Tire & Rubber Co.
United States Rubber Co.
Tires (Truck, Passenger Cars, Tractor)
Firestone Tire & Rubber Co.
Goodyear Tire & Rubber Co.
United States Rubber Co.
Tools (Drill) (See Drilling Accessories)
Track Shifters
Nordberg Mfg. Co.
Tractors
*Allis-Chalmers Mfg. Co.
Trailers
Mack Trucks, Inc.
Tramways (Aerial)
*American Steel & Wire Co.
*Roebling's Sons Co., John A.
Transformers
*Allis-Chalmers Mfg. Co.
Transmission Belting (See Belting)
Transmission Machinery
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Trippers
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Truck Cranes (See Cranes)
Truck Mixers
Jaeger Machine Co.
Trucks and Trailers (See Motor Trucks)
Tube-Mills (See Mills—Ball, Tube, etc.)
Tubes (For Tire Casing)
Firestone Tire & Rubber Co.
Goodyear Tire & Rubber Co.
United States Rubber Co.
Underground Loaders
*Allis-Chalmers Mfg. Co.
Unloaders (Box Car)
Fuller Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Variable Speed Reducers or Transmissions
*Link-Belt Co.
Valves (Pump)
Taylor Forge & Pipe Works
Vibrating Screen Plate
Chicago Perforating Co.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Morrow Mfg. Co.
Vibrating Screens (See Screens —Vibrating)
Vibrators
*Jeffrey Mfg. Co.
Tyler Co., W. S.
Wagons (Dump)
*Austin-Western Road Machy. Co.
Le Tourneau, R. G.
Washers (Sand, Gravel and Stone)
*Allis-Chalmers Mfg. Co.
*Eagle Iron Works
Haiss Mfg. Co., Geo.
*Hardinge Co.
Iowa Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Knickerbocker Co.
Lewistown Foundry & Machinery Co.
*Link-Belt Co.
McLanahan and Stone Corp.
*Pioneer Gravel Equip. Mfg. Co.
*Smidth & Co., F. L.
Smith Engr. Works
Universal Road Machy. Co.
Welding & Cutting Equipment
McLean Welded Products Corp.
Ryerson & Son, Joseph T.
Welding Supplies
American Manganese Steel Co.
*American Steel & Wire Co.
McLean Welded Products Corp.
*Roebling's Sons Co., John A.
Ryerson & Son, Joseph T.
*Wickwire Spencer Steel Co.
Well Drills (See Drills—Well)
Wheels (Car)
American Manganese Steel Co.
*Eagle Iron Works
Iowa Mfg. Co.
Wheel Rims. See Rims—Wheel
Winches and Capstans
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
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*American Steel & Wire Co.
*Roebling's Sons Co., John A.
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Cleveland Wire Cloth & Mfg. Co.
*Robins Conveying Belt Co.
*Roebling's Sons Co., John A.
Smith Wire & Iron Works, F. P.
*Wickwire Spencer Steel Co.
Wire Rope
*American Steel & Wire Co.
*Roebling's Sons Co., John A.
Ryerson & Son, Joseph T.
*Wickwire Spencer Steel Co.
Williamsport Wire Rope Co.
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*American Steel & Wire Co.
*Roebling's Sons Co., John A.
Ryerson & Son, Joseph T.
*Wickwire Spencer Steel Co.
Williamsport Wire Rope Co.
Wire Rope Slings
*American Steel & Wire Co.
*Roebling's Sons Co., John A.
*Wickwire Spencer Steel Co.
Williamsport Wire Rope Co.
Wire (Welding)
*American Steel & Wire Co.
McLean Welded Products Corp.
*Roebling's Sons Co., John A.
Ryerson & Son, Joseph T.
*Wickwire Spencer Steel Co.
Worm Gears (See Gears and Pinions)

*** See also information in the 1935 Pit and Quarry HANDBOOK.**

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Stripping with a LeTourneau 6-yard Carryall preliminary to dredging for gold.

Use LeTOURNEAU EQUIPMENT

Big loads—25 to 30 yards of material to the trip—cut this operator's costs, up his profits.

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R. G. LeTourneau, Inc.

Peoria, Illinois Stockton, Calif.

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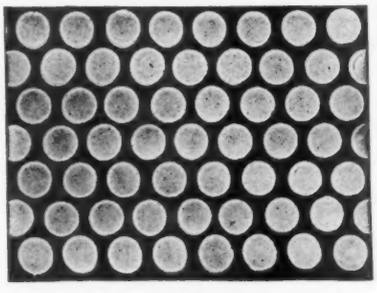

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Specify for

Flat Plates

Round Sections

Buckets

Troughs

Vibrating and

Special Screens

Build long service life and low maintenance cost into your screening equipment by using these extra-durable screen plates. Solid one-piece Morrow metal of high abrasive resistance, free from any weakening joints or intersections—that means economy in production, an important item in your profits in these days of close margins.

Write for Bulletin No. 57

Advantages:

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Special Alloy Metal

Accurate Punching

Variety of Sizes

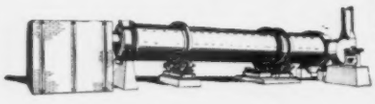
Any Perforation

Prompt Service

THE MORROW MANUFACTURING CO., Wellston, Ohio

Ruggles-Coles

DRYERS



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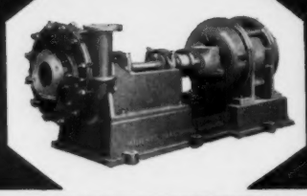
New York—122 E. 42nd St. San Francisco—444 Market St.

MORRIS

CENTRIFUGAL PUMPS



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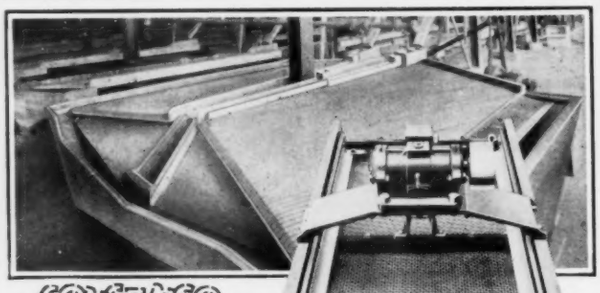

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Perforated Metals—Screens of All Kinds—For Sand, Gravel, Stone, Etc.

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CRUSHERS—Double roll and Sledge Wedge Crushers, for practically any product. Capacities to 1000 tons an hour.

SUPER DRY PANS—For especially large tonnages.

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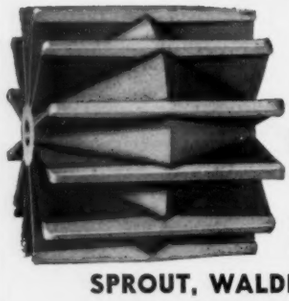
SAVE YOUR CONVEYOR

and

Elevator Belts *with* SPROUT-WALDRON Wing Pulleys



Interchangeable with standard pulleys. Nothing can lodge between belt and pulley.

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Unique principle of hydrosealing both sides of the impeller against abrasive wear, cuts maintenance to a fraction and saves ⅓ in power costs in pumping sand, gravel, rock and other abrasive materials—Estimated economies guaranteed. Sizes 2" to 22", pulley or motor drive. Descriptive Catalog sent on request.

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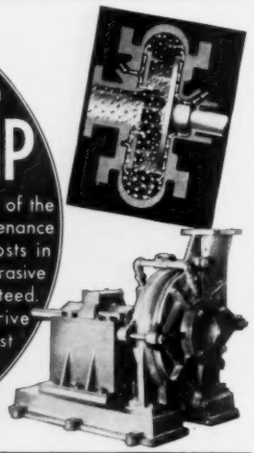

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CRUSHERS DRY PANS

Lewistown Foundry & Machine Co.
Lewistown, Pa.

Falls Sand and Gravel Co., Scranton, Pa.

KNICKERBOCKER Soft Stone Eliminator

Meeting the State's Demand

What would you do with a bank of gravel that was swell for concrete except that it had 8% friable material—and the State put a limit of 2% on friables? If you were wise you'd do what Falls Sand and Gravel Co., Scranton, Pa., did. They installed a Knickerbocker Soft Stone Eliminator and reduced friable content to well under 2%—they're doing it efficiently and economically.

What objectionable material do **you** want to get rid of?

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..that's why JAEGER TRUCK MIXERS Outsell All Others

Because they offer every facility for the faster delivery of better concrete ("Dual-Mix" action, 1-man chute, dual controls, rapid accurate water tank and patented discharge) Jaeger Truck Mixers get most of the jobs, serve them at lowest cost, and continue to outsell all other makes. Sizes 1 to 5 cubic yards.

Write for details, prices.

1-Man Spout Saves Minutes on Every Trip.

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THE HEART *of the* EFFICIENT CRUSHING PLANT

● Above, No. 1838 Primary Breaker, designed for tremendous strength. Best roller bearings available. Large capacity. Other crushers: 920, 1220, 1520, 940, 440.

● No. 3018 Roll Crusher, specially designed bearings inside the roll on fixed shaft for maximum support without bearing strain.

● A crushing and screening plant can be no more efficient than its crushing units. Austin-Western Portable plants offer great advantages, but many fixed plants can be greatly improved by installation of Austin-Western Crushers (two of which are shown here). Quarry superintendents and other producers are urged to set themselves up now for a trouble-free season. Send the coupon for details on crusher units or complete plants.

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Send details on ☐ complete Austin Western Plants ☐ No. 3018 Roll crusher ☐ No. ..... Primary Breaker.
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City ..... State 466

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ROAD ROLLERS, CRUSHING & SCREENING PLANTS, SCARIFIERS, SWEEPERS & SPRINKLERS, ROAD GRADERS, ELEVATING GRADERS, MOTOR GRADERS, DRAGS, SHOVELS, DISTRIBUTORS, WAGONS, SNOW PLOWS.

Ryerson Abrasion Resisting Sheets and Plates Last Longer

Developed expressly for abrasion resistance, this new type steel will last many times longer than ordinary steel.—Low in price. Let us send you complete data. Write for bulletin. Joseph T. Ryerson & Son, Inc., Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Philadelphia, Jersey City, Boston.

RYERSON STEEL

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SPIRAL PIPE

Stronger gauge for gauge than any other type. Light weight. Low initial cost. Easy to handle or move. Stout and rigid. Smooth, full-flow interior. Available in steel or Armco Ingot Iron. Write for Catalog.

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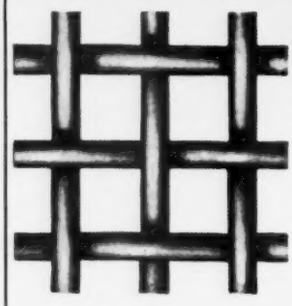

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Tough and Economical

Made of a special Spring Steel Wire to resist extreme abrasion and withstand severe vibration.

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- ☐Agitators, Slurry
- ☐Air cleaners
- ☐Air compressors
- ☐Bag filling and weighing machinery
- ☐Bags, cloth
- ☐Bags, paper
- ☐Balls, steel
- ☐Barges, steel
- ☐Belt dressing
- ☐Belt fasteners
- ☐Belting, conveyor and elevator
- ☐Belting, transmission
- ☐Belt lacing
- ☐Belt plates
- ☐Belt rivets
- ☐Belt tighteners
- ☐Bin gates
- ☐Bins, concrete
- ☐Bins, steel
- ☐Blasting supplies
- ☐Blasting powder
- ☐Blocks, friction
- ☐Boats, self-unloading
- ☐Bodies, Motor Trucks
- ☐Brake Linings
- ☐Buckets, Clamshell
- ☐Buckets, Conveyor and Elevator
- ☐Buckets, Dragline
- ☐Buckets, Orange Peel
- ☐Cableways, Slackline
- ☐Calcining Machinery
- ☐Car Dumpers
- ☐Car Pullers and Movers
- ☐Carriers, Belt
- ☐Cars, Dump
- ☐Cars, Kiln
- ☐Castings, Manganese Steel
- ☐Castings, Steel
- ☐Chains, Conveyor and Elevator
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- ☐Chains, Transmission
- ☐Chutes
- ☐Classifiers
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- ☐Clutches, Magnetic
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- ☐Conveyors, Pneumatic
- ☐Conveyors, Screw
- ☐Conveyors Skip
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- ☐Crushers, Gyratory
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- ☐Dredges, Ladder
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- ☐Drills, Diamond Core
- ☐Drills, Hand Hammer
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- ☐Dryers, Sand and Gravel
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- ☐Dynamite
- ☐Elevators, Bucket
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- ☐Gears
- ☐Goggles
- ☐Governors
- ☐Grinding Balls
- ☐Grizzlies
- ☐Guns, Hydraulic
- ☐Hoists, Air
- ☐Hoists, Derrick
- ☐Hoists, Drum
- ☐Hoists, Motor Truck Body
- ☐Hoists, Skip
- ☐Hose, Air Steam, Water
- ☐Hose, Sand Suction
- ☐Hydrators
- ☐Kettles, Calcining
- ☐Kilns, Rotary
- ☐Kilns, Vertical
- ☐Linings, Kiln
- ☐Loaders, Portable
- ☐Loaders and Unloaders, Box Car
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- ☐Pulverizers, Ring
- ☐Pulverizers, Rod
- ☐Pulverizers, Roll
- ☐Pumps, Centrifugal
- ☐Pumps, Deep Well
- ☐Pumps, Sand and Gravel
- ☐Pumps, Slurry
- ☐Pumps, Steam
- ☐Radiators, Engine Cooling
- ☐Rails
- ☐Refractories
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- ☐Screens, Shaking
- ☐Screens, Vibrating
- ☐Separators, Air
- ☐Separators, Dry Centrifugal
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- ☐Shovels, Gasoline
- ☐Shovels, Steam
- ☐Skips
- ☐Sleeves, Dredge
- ☐Slugs and Nuggets, Grinding
- ☐Speed Reducers and Gears
- ☐Spray Nozzles
- ☐Sprays, Paint
- ☐Sprockets
- ☐Steel, Tool
- ☐Stokers
- ☐Switches, Track
- ☐Tanks, Concrete and Steel
- ☐Tanks, Sand Settling
- ☐Tanks, Wood
- ☐Thickeners, Slurry
- ☐Track, Portable
- ☐Track Shifters
- ☐Tractors, Crawler
- ☐Tramways, Aerial
- ☐Trippers, Belt
- ☐Trippers, Tramway
- ☐Unloaders
- ☐Valves, Pump
- ☐Washers and Scrubbers, Sand, Gravel, Stone
- ☐Weighters, Automatic
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- ☐Winches
- ☐Wire Cloth
- ☐Wire Cloth, Manganese Steel

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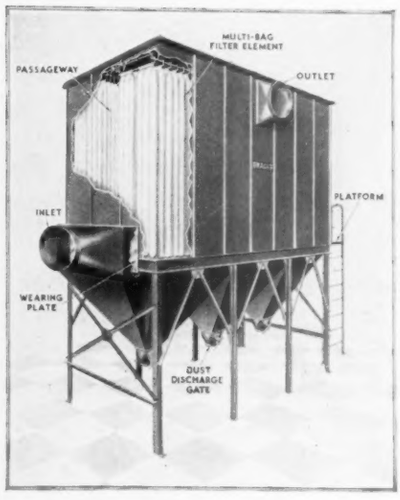
BECAUSE it is the most successful, most satisfactory and most profitable—which fact you can confirm from users, and reason out from reading the Haiss catalogs. Four Standard Haiss Loaders—1 to 3 yds. per minute.

Ask for catalogs

George Haiss Manufacturing Co., Inc.
142d St. & Rider Ave., New York, N. Y.
Builders also of HAISS ELEVATORS—SCREENS—CLAMSHELL BUCKETS

The New DRACCO MULTI-BAG FILTER



Solves DUST CONTROL Problems

The New DRACCO MULTI-BAG FILTER was developed to supply the growing need for ECONOMICAL and EFFICIENT Dust Control protection. Developed by an organization with many years experience it has features of construction that contribute to High Dust Collecting Efficiency. There are no frames or wire screens—because of the compactness of MULTI-BAG construction you obtain large Filter area in a very small space.

Dust Control Pays LARGE Dividends

DUST is an EXPENSIVE element that it will PAY to Control. It has been the ruination of many plants. With high speed production it is becoming a greater menace each year with many State Legislatures proposing drastic means to protect workers. It is the source of expensive law suits. It is your privilege to draw from our 20 years of Dust Control experience in solving your problems,—no obligations.

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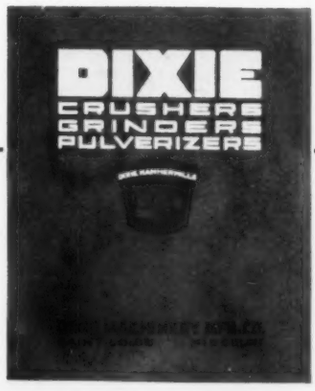
DRACCO CORPORATION
Successors to The Dust Recovering & Conveying Co.
4069 E. 116th St. Cleveland, Ohio

Write for this complete catalog



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NON-CLOG HAMMERMILL

IF you're smart enough to buy a mill on merit, there are five "crushing" arguments why you should buy DIXIE: (1) Its non-clogging feature prevents choking on any kind of feed. (2) It has a moving breaker plate 26 times the average wearing area. (3) Its extra sturdy construction means minimum maintenance. (4) Its powerful crushing action gives maximum output for its size. (5) It is built in 40 different sizes for all capacities in primary, secondary or fine reduction.

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DIESEL ENGINES

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NOW OVER 3,000,000 MILES A MONTH IN HEAVY-DUTY TRUCKS

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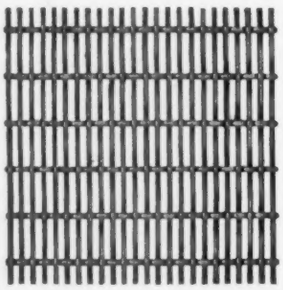

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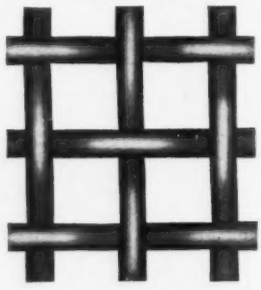

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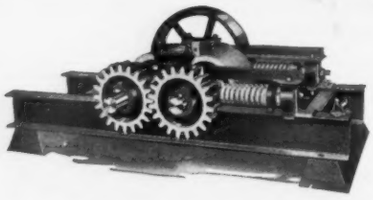

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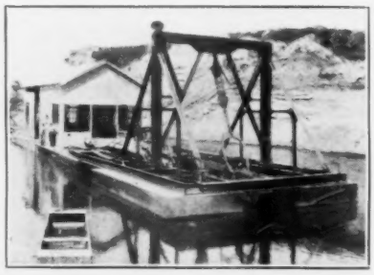

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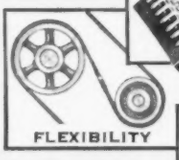

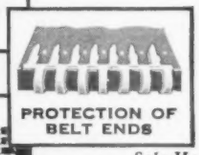

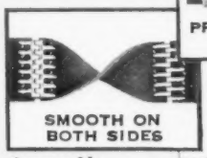

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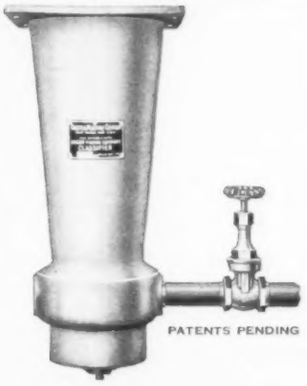

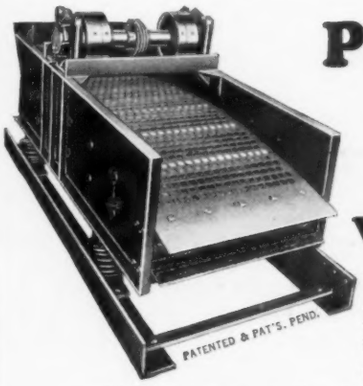

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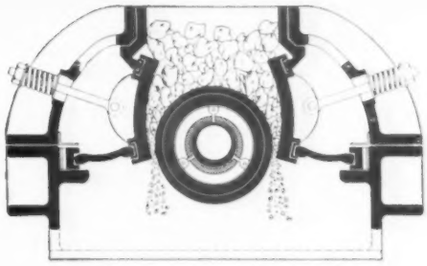

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REDUCTION CRUSHER built with

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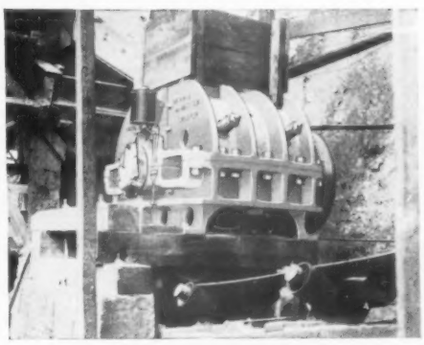

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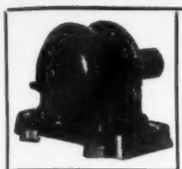

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400	West. sl. rg.	514
400	Al. Ch. syn.	300
300	Al. Ch. sl. rg.	585
260	Al. Ch. syn.	720
250	West. sl. rg.	730
200	G. E. sl. rg.	1200
200	West. sl. rg.	800
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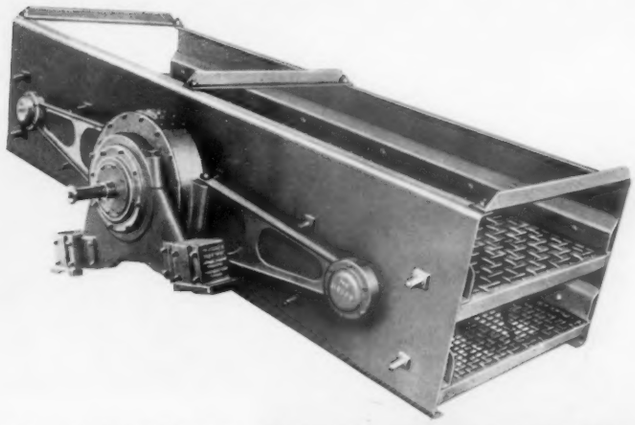

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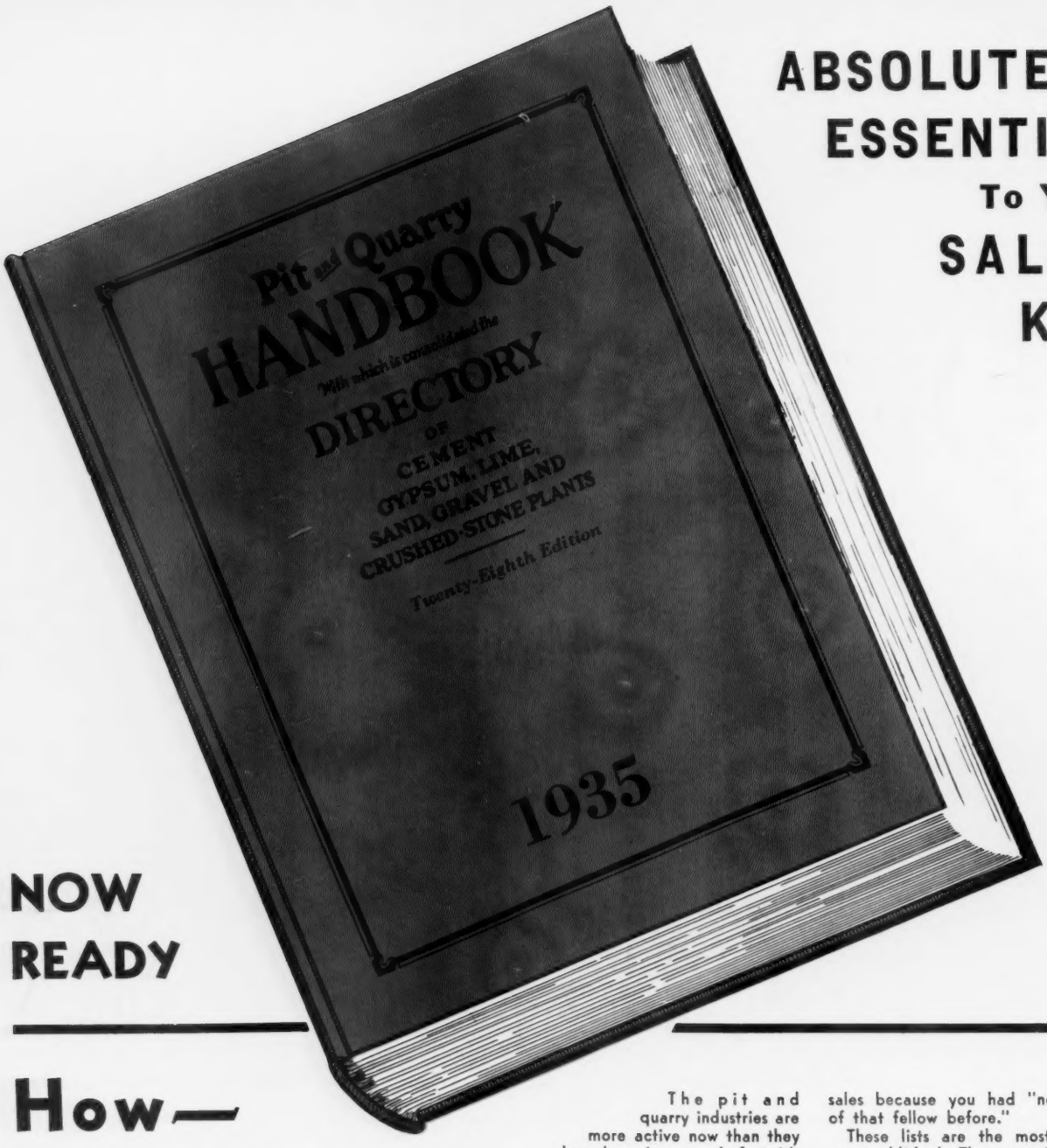

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